FOR
BETTER MANAGEMENT
OF
PLANT OPERATIONS

FACTORY

january 1961

PRICE ONE DOLLAR

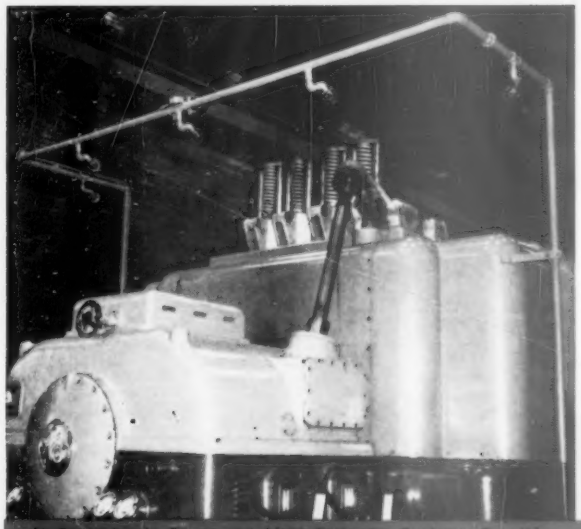
A McGRAW-HILL PUBLICATION

GLOBAL SURVEY
OF QUALITY
CONTROL
p. 42

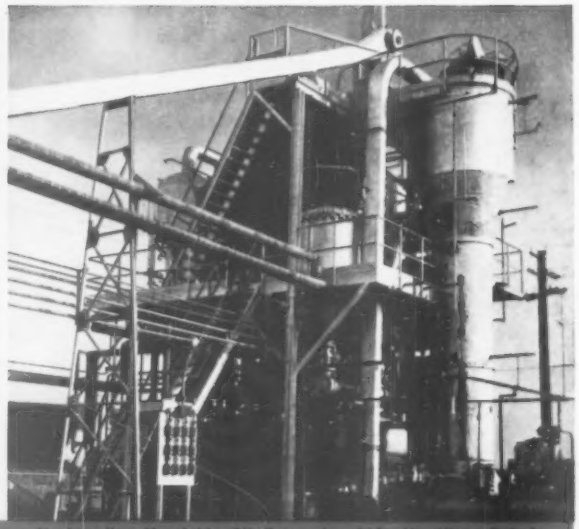
BUILDING
MATERIALS
TRENDS
p. 50

THE LATEST IN
TELEPHONES
p. 52

COVER STORY
REPAIR BUDGET
SPURS PROFITS
p. 76

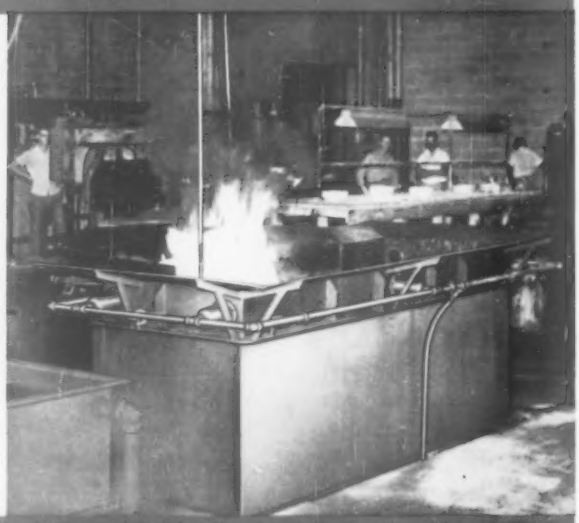


At Pennsylvania Power and Light Company, Sunbury, Pa., this steam generator is protected by an automatic Grinnell ProtectoSpray system in the event of outside fires and by a Dry Chemical system inside the casing.



At Canadian Vegetable Oil Processing Ltd., Hamilton, Ontario, Grinnell ProtectoSpray safeguards upper structure of this hexane solvent extraction unit, while a ProtectoFoam system guards the lower section.

At the RCAF supply depot at Namao, Alberta, this infrared drying oven is protected by a Dry Chemical system installed by Grinnell to protect against possible fire resulting from ignition of flammable vapor mixtures.



At Dresser Industries, Inc., Dallas, Texas, hot metal temporarily ignites resulting vapors as metal is being submerged. If fire should get out of control, a Grinnell-installed Carbon Dioxide system is on guard to extinguish it quickly.

You can rely on Grinnell for the right protection against destruction by fire!

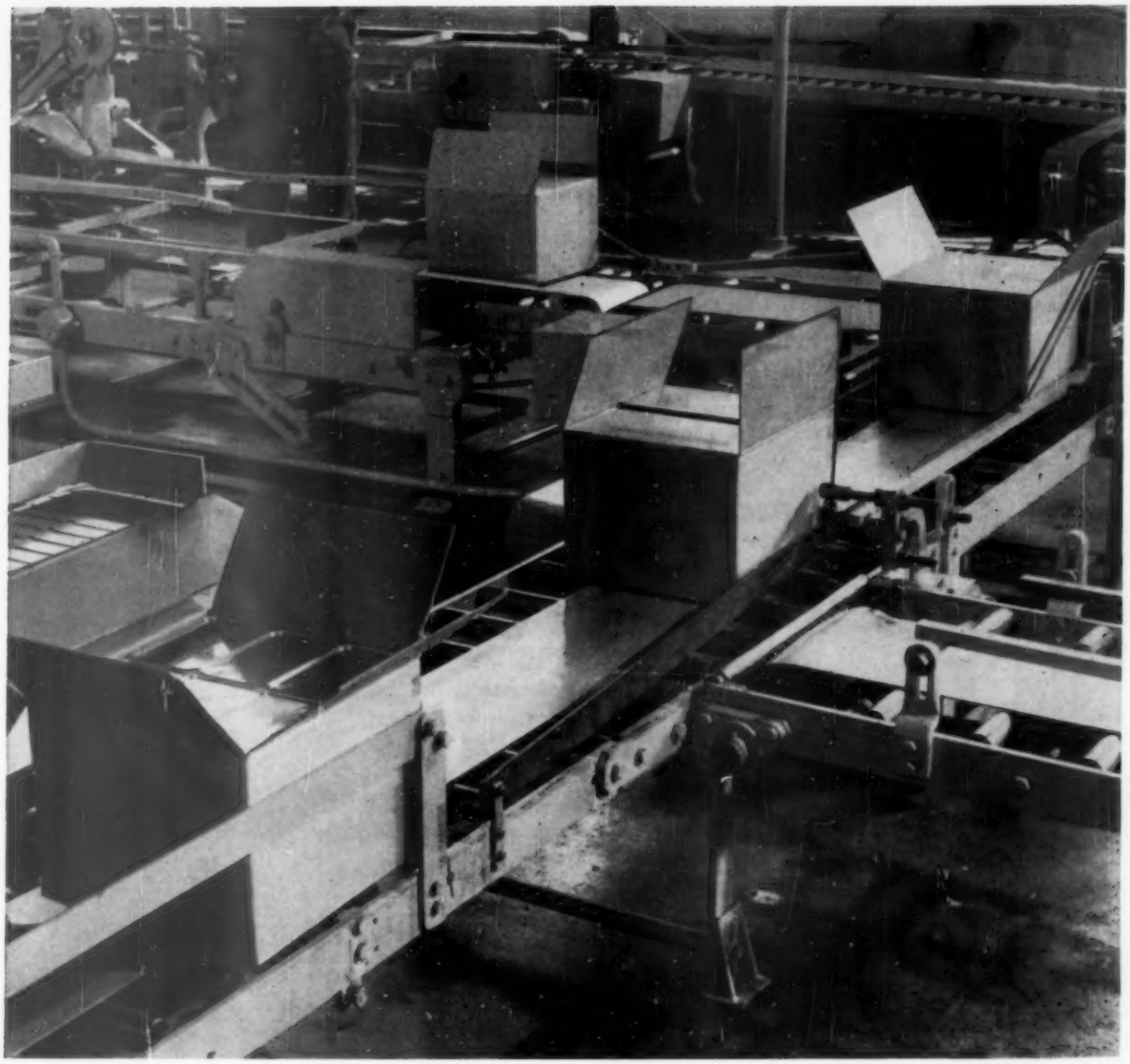
Grinnell has had 90 years experience in devising fire protection systems for all kinds of fire hazards — systems which can be relied on to protect the continuity of your business and to safeguard your dollar investment. Grinnell offers you quality-controlled manufacturing, layouts by experienced engineers, and installations by skilled crews. Let Grinnell engineers help you select the right system.

16 mm. Sound-Color Film—Get up to date on fire with Grinnell's 35-minute film — "Fire Protection Through Research." Both typical and unusual fire hazards are described and demonstrated. To borrow this film, without charge, write — Grinnell Company, Providence 1, Rhode Island.

GRINNELL

FIRE PROTECTION SYSTEMS SINCE 1870

For more facts circle 382 on READER SERVICE CARD



Koroseal belts wear well even when the going is rough

THE scuffing and scraping of those heavy cartons would scratch ordinary belts, ruin them fast. That's because the conveyor must keep moving even when the cartons are stopped for inspection and stamping. But B.F.Goodrich belts, made of Koroseal flexible material, show no sign of wear after years of this service.

Koroseal conveyor belts resist scuffing, scraping, cutting—stand oil, grease, most acids and just about everything else that ruins other belts. This makes them ideal for such problem jobs as handling oily, abrasive machine parts, raw bricks, even certain chemicals.

A Koroseal belt has a tough cover that never gets soft or sticky. Oil can't penetrate it, dirt can't grind in—so Koroseal belts stay clean longer, clean up easier than those made of other materials.

In addition to conveyor belts made of Koroseal, B.F.Goodrich has developed a series of belts, designed to tackle different in-plant conveying problems—from bringing raw materials in—to moving machined parts on production lines—to taking packaged goods from one floor to another.

For more details, ask for a copy of the B.F.Goodrich "Conveyor Belt Selector". Either call your nearby BFG distributor or write the *B.F.Goodrich Industrial Products Co., Dept. M-940, Akron 18, Ohio.*

Koroseal—T.M. Reg. U.S. Pat. Off.

B.F.Goodrich

CONVEYOR BELTS

FOR BETTER
• PLANT MAINTENANCE & ENGINEERING
• PRODUCTION
• PLANT MANAGEMENT

JANUARY 1961

FACTORY

PUBLISHER
Donald H. White

EDITOR-IN-CHIEF
Lester R. Bittel

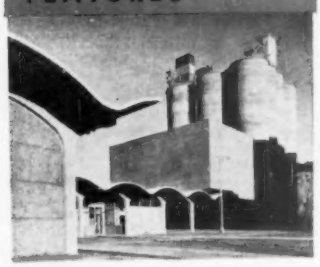
MANAGING EDITOR
Robert S. Rice

SENIOR EDITOR
Carl G. Wyder—Plant Maintenance and Engineering

ASSOCIATE EDITORS
Oswald Stewart—Buildings
Gerald C. Quinn—Electrical
Willis A. Bussard—Production
Roger W. Christian
Lawrence F. Mihlon
Richard L. Grant

COPY EDITOR
Joan C. Hopkins

FEATURES



EXCLUSIVE REPORT—World-wide quality control **42**
Foreign firms close the gap.

Industrial migration continues westward **48**

What's ahead in industrial construction? **50**
Experts at Building Congress see new materials challenging steel.

Updating plant telephones **52**
The very latest in systems and equipment.

Old timers get a new lease on life **57**

Performance recorder tags breakdowns automatically **60**

Non-destructive testing—E & T Report No. 10 ..... **61**

Atomic war on costs **68**
Multi-million-dollar saving with this intensive program.

Maintenance—pillar or parasite? **72**
It all depends on management's attitude toward the function.

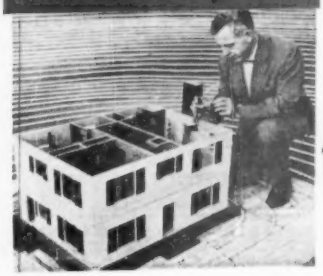
Plant engineering gets a place in the sun **73**

COVER STORY—Repair budget spurs profits **76**
Managed maintenance adds black ink to the balance sheet.

Eyes saved are dollars saved, too **80**
At Twin Coach, a safety program slashed operating costs.

Your guide to the plant maintenance and engineering show **121**
The windy city plays host this year.

CASE BOOK p. 229



Production-line scrap can be a headache in any large plant. Meredith solved the problem by air (page 230) . . . **Maintenance department on wheels** saves precious minutes at Gates (page 232) . . . **Vending machines** at National Lead serve anything from turkey to lasagna (page 233) . . . **A simulated atomic attack** on a model building can reveal whether or not your present or proposed plant is a radiation death trap (page 233).

ASSISTANT EDITORS
Norman H. Solon—Case Book
Vivian E. Lunardi—Departments
Gladys Owen—Departments
Eleanor Miller—Statistical Research
James R. Lindroth

ART DEPARTMENT
Carl Cerminaro, Director
Eleanore Luke

READER SERVICE
Regina Rodolico

CONSULTING EDITORS
L. C. Morrow
Lewis K. Urquhart

WORLD NEWS BUREAUS
John Wilhelm, Director
Margaret Ralston, Assistant Manager

DOMESTIC NEWS BUREAUS
Washington:
George B. Bryant, Director
Alan E. Adams, Labor Trends
Atlanta: B. E. Barnes
Chicago: Stewart W. Ramsey
Cleveland: Arthur Zimmerman
Detroit: Donald MacDonald
Dallas: Marvin Reid
San Francisco: Jenness Keene
Los Angeles: Kemp Anderson
Seattle: Ray Bloomberg

FOREIGN NEWS BUREAUS
London, Paris, Bonn, Moscow
Mexico City, Tokyo, Beirut
Caracas, Rio de Janeiro

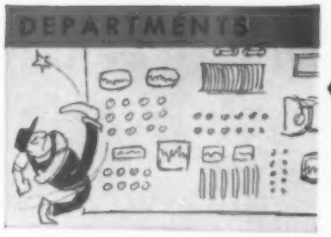
McGRAW-HILL DEPARTMENT OF ECONOMICS
Douglas Greenwald, Manager of Economic Services
William J. Brown, Cost Index
Alfred Litwak, Business Trends

ADVERTISING AND BUSINESS DEPARTMENT
H. R. Mathias, Advertising Sales Manager
Charles E. Walsh, Promotion & Research Manager
William J. Thierer, Business Manager

CIRCULATION DEPARTMENT
Bain Brown, Manager

DISTRICT MANAGERS
L. E. Crist, Boston
J. G. Sabella, D. B. Waite, 500 5th Ave., N. Y. 36
L. L. Graves, Philadelphia
R. A. Dilley, Pittsburgh
W. H. Ware, Cleveland
T. W. Van Winkle, Detroit
B. M. Kewin, A. B. Martin, R. P. Rose, Chicago
B. M. Kewin, St. Louis
R. L. Yocom, Los Angeles
J. H. Hernan, San Francisco
M. H. Miller, Atlanta
John Grant, Dallas
Gene Holland, Houston
J. W. Patten, Denver
E. E. Schirmer, Malcolm Thiele, London; M. R. Zeynel, Geneva; Stanley Kimes, Frankfurt

PRESS TIME REPORT: Looking ahead in business, Problem-solving guide, Cost index of plant maintenance, and Looking ahead in labor ..... *after* **34**
EDITORIAL: Preventive maintenance still hampered by old equipment **41**
EQUIPMENT NEWS: A dock leveler with a telescoping platform **84**
LABOR RELATIONS NEWS: Are psychoneurotic workers special cases? **193**
CATALOG NEWS: How to clean up that old radioactive dust—and 55 more **216**
MATERIALS NEWS: Packing material is clean, odorless, re-usable **243**



LETTERS: A timely question about the plant engineering function **6**
HUMAN RELATIONS: Machine divorces layoffs from office politics **114**
IDEAS OF THE MONTH: Noise-proof—but not conversation-proof—ear plugs **184**
BOOKS: Authors treat production control, industrial relations **206**
FILMS: Fire control, proper care and feeding of your ball and roller bearings **213**
ADVERTISERS' LITERATURE: Printed matter offered in our ads **250**

In February, we'll present an outstanding example of small plant modernization which required no downtime at all . . . And an exclusive report on what to expect from the new administration in the way of taxes, government spending, legislation, and aid to small businesses. **In coming months,** look for a discussion of what's wrong with safety management and a treatment of the present crisis in civil defense.

COVER

Working to achieve proper plant and equipment upkeep and to make profitable improvements, Managers (left to right) Minckler, Soden, and Stratmeyer confer at Monsanto Krummrich plant site.

Painting by Frank Lacano

70TH YEAR OF PUBLICATION
JANUARY 1961 Vol. 119 No. 1
Published monthly by McGraw-Hill Publishing Company, Inc.
U. S. subscription rate for individuals in the field of publication: $2 per year; single copies: $1. Canadian and foreign rates on request.
Executive, Editorial, Circulation, and Advertising Offices: McGraw-Hill Building, 330 West 42nd St., New York 36, N. Y.
Printed in Albany, N. Y.; second-class mail postage paid at Albany, N. Y., and at New York 1, N. Y.
Postmaster: Please send Form 3579 to Fulfillment Manager, FACTORY, 330 West 42nd Street, New York 36, N. Y.

Towmotor backs up outstanding performance

with Towmotor dependable service

When you purchase Towmotor equipment you can be sure it will never be out of service very long . . . for two very good reasons:

1. Towmotor fork lift trucks are built to last, and built to perform continuously.
2. When needed, you get fast and skillful repair and maintenance service from your local dependable Towmotor representative.

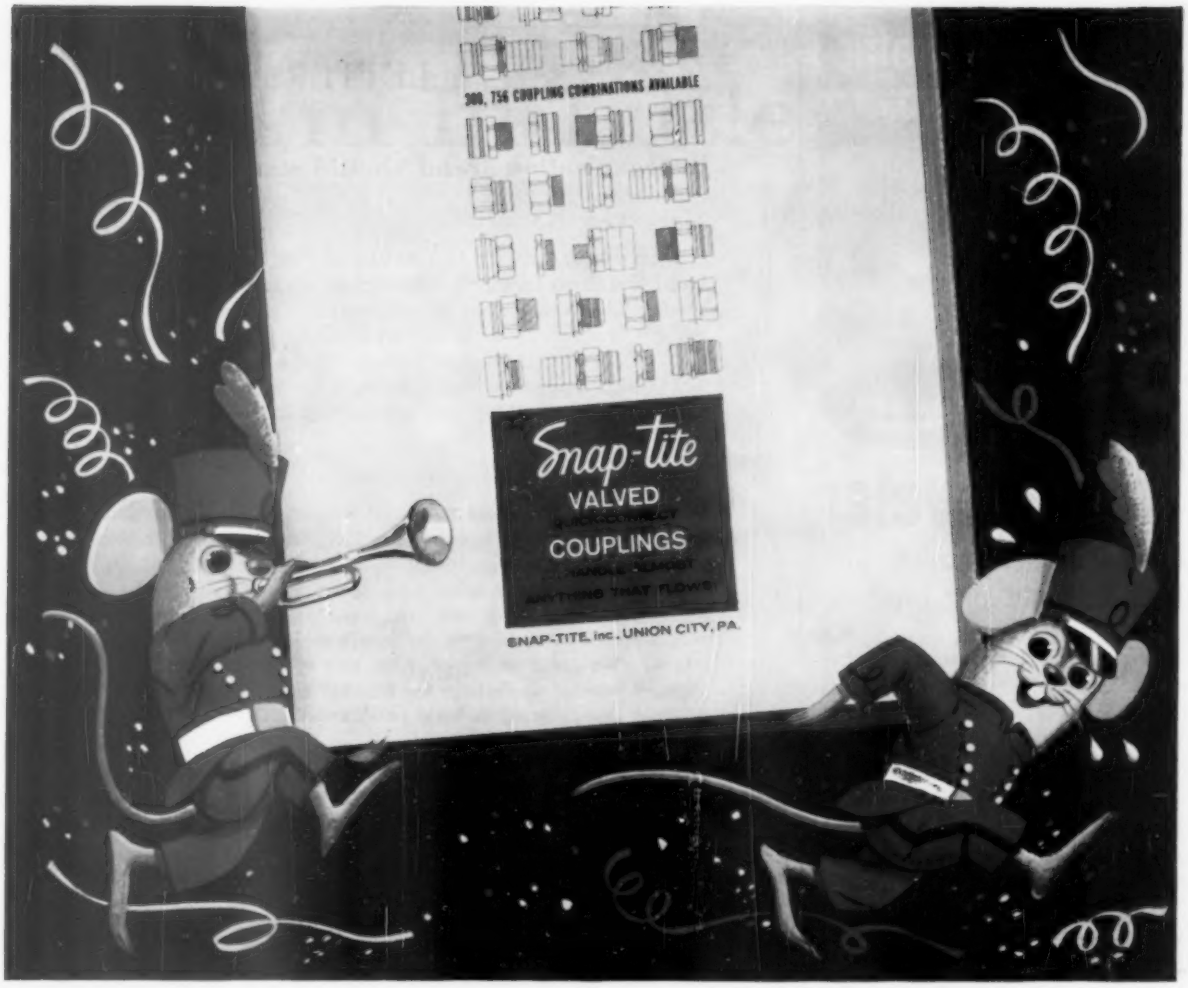
Your Towmotor representative will never let downtime cut into the money you *save* by owning a Towmotor fork lift truck! That's why Towmotor customers keep buying Towmotor equipment. Ask for complete information on Towmotor equipment and Towmotor Preventive Maintenance Service. Write Towmotor Corporation, Cleveland 10, Ohio.

TOWMOTOR THE ONE-MAN-GANG® **-GERLINGER***

FORK LIFT TRUCKS, CARRIERS AND TRACTORS SINCE 1919

*Gerlinger Carrier Co. is a subsidiary of Towmotor Corporation

For more facts Circle 385 on Reader Service Card



announcing—a dynamic new catalog for coupling users

complete specs on 308,756 possible coupling combinations

And it's hot off the press! This comprehensive new 62 page catalog contains complete information on all sizes and types of Snap-Tite quick-connect, quick-disconnect couplings for:

positive pressure applications; impact air tools; high pressure, vacuum and very low pressure; hard-to-handle fluids; no-spray applications; no-spill aircraft and missile applications.

Included are descriptive cutaway and exploded illustrations and complete weight and dimensional data for all sizes, ¼" to 6". Working pressures, flow, pressure drop and spillage data are also provided in detailed graphs and charts.

SPECIAL! RUBBER GASKET USAGE GUIDE SECTION
For the first time in the quick-connect coupling field, a compilation of complete selection data describing packer seals to use in handling over 300 fluids and gases.

Write today on your company letterhead for free copy!

Snap-tite

UNION CITY, PA.

For more facts Circle 386 on Reader Service Card

Speed dock traffic

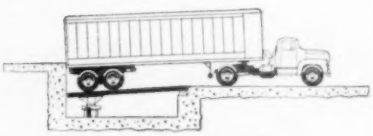
NEW MODEL

Rotary®

Truck Leveler

handles modern trailers with high beds and long overhang

Just a touch of a button and any truck bed is brought into perfect platform level at loading docks equipped with the Rotary Truck Leveler. Dangerous inclines between dock and truck bed are eliminated so that materials handling equipment can move in and out with maximum speed and safety. This modern hydraulically-operated device now has a 16′ platform and 3′ vertical travel to accommodate highway carriers of all sizes. The Rotary Truck Leveler can be installed at new or existing buildings and saves valuable space since it is recessed into the pavement in front of the loading dock.



RAISES OR LOWERS TRUCK BED TO DOCK LEVEL

ROTARY LIFT COMPANY

Division of Dover Corporation

Memphis, Tenn.—Chatham, Ont.

MAIL COUPON FOR CATALOG

Rotary Lift Company
1063 Kentucky, Memphis 2, Tenn.
Please send catalog on Rotary Truck Leveler to:

Name_____

Company_____

Address_____

_____

6 **Circle 387 on Reader Service Card**

FACTORY LETTERS

Reorganization trend should start high

Dear Sir:

I am considering the revision of the plant engineering function in our company and would like any information available that might assist me.

In our group, we all follow the monthly articles in FACTORY, and have many reference files. But we have not been foresighted enough to keep information on plant engineering organization.

(Name Withheld)

Plant Engineer

► **FACTORY has noted this trend toward reorganization. But one big fault has been the lack of proper recognition of the function by top management and by operating people. The organization of the function itself is not enough. It must be properly placed within the entire plant organization. Our cover story (see page 76) describes one very successful program. This may not be the best way for you, however. There are several other excellent organizations that operate on almost diametrically opposed principles. Perhaps the best advice is to proceed with care and to tailor the program to local conditions.—ED.**

FACTORY plays post office

Dear Sir:

We would like to obtain a copy of the Compressed Air Handbook, as mentioned in your report, "Compressed Air Systems" in the October issue of FACTORY (page 94). However, the letter we sent to the Compressed Air and Gas Institute was returned for insufficient address.

We would greatly appreciate your advising us where we might obtain this book, if possible.

C. MacDonald

Purchasing Agent
Urschel Laboratories, Inc.
Valparaiso, Ind.

► **Compressed Air and Gas Institute headquarters are at 122 East 42nd St., New York 17. The new handbook, published this month, can also be obtained from the Institute's Education Committee at 55 Public Square, Cleveland 13. The price is $8.—ED.**

Credit due APICS founder

Dear Sir:

Your very fine October editorial on the American Production and Inventory Control Society was brought to my attention and I feel that a few words of clarification are in order.

The formation of APICS came about as the result of a training course which the National Institute of Management had been giving since 1954, and which I organized. Mr. Maddox (whom you mention as the leader of the new society) was one of the conference leaders.

From this set of seminars, I selected 35 names and wrote to them requesting that they meet me for the

Now I'm In Little League

Since We've Converted "Down-time" to "Spare-time" by Specifying Silicones

Three years ago, when Little League baseball was organized in our community, I was interested. Because I'm a family man with three boys, and I'd been a fair ball player, I was asked to manage a team. I wanted to help, but with my job, I knew I wouldn't have the time.

You see, I'm maintenance manager at the local foundry and metal working plant. We have more than 1500 integral horsepower motors. When a motor burns out, it has to be replaced immediately. With the increased frequency of failure in the summer... plant temperatures skyrocket... my time is not my own.

One day I saw a Dow Corning advertisement about silicone insulated motors. I wrote them and got all the information... technical data, too. After studying the material, I suggested to management we run our own life tests by having our problem motors rewound with silicones instead of with Class B insulation, as we were doing.

Result: we now specify silicone insulation in all of our motors exposed to heavy duty cycles, shock loads, frequent start-stop-reverse operation, high ambient temperatures and humidity. Savings are around $5000 a year . . . *not counting the savings in production and maintenance time.*

The sharp reduction in motor maintenance has given me some free time. This summer I managed a Little League team. By the way, my oldest boy looks great at second base, and he's no slouch at the plate.

Say, why don't you write Dow Corning for their literature on silicone insulated motors and transformers? I'm glad I did.

(This fictional story is based on actual plant experience with silicone insulation. Name provided on request.)

For information on silicone insulated motors, write Dept. 3613

first in silicones

Dow Corning CORPORATION
MIDLAND, MICHIGAN

ATLANTA BOSTON CHICAGO CLEVELAND DALLAS LOS ANGELES NEW YORK WASHINGTON, D. C.

For more facts Circle 388 on Reader Service Card

The PERFECT FIT!

"Job-Mated" cranes by Shepard Niles fit the job picture perfectly because each one is built to meet exact on-the-job conditions. The ideal combination of capacity, clearance, speed and controls is specified to assure years of highly efficient, economical service, and to keep wear and maintenance to a minimum.

With the most complete line of quality-built cranes in America to choose from, you can be sure you have the **right** crane for the job—a **"Job-Mated"** crane by Shepard Niles—from 500 lbs. to 500 tons.

For further information on Shepard Niles cranes, and how they can improve your plant operation, write for a descriptive bulletin, and ask to have a Shepard Niles representative call at your convenience.

SHEPARD NILES
CRANE AND HOIST CORPORATION

3306 Schuyler Ave., Montour Falls, N.Y., U.S.A.

For more facts Circle 389 on Reader Service Card

purpose of forming a Production Control Society. We met on Mar. 9, 1957, in Cleveland; I acted as temporary chairman.

By the time Mr. Maddox was elected president, the society was well organized and functioning.

I hope that, in the future, you will find a place to credit the National Institute of Management and me for our part in the formation of America's fastest-growing society.

Nyles V. Reinfeld
National Institute of
Management, Inc.
Cleveland

Rebel cheer

Dear Sir:

FACTORY's staff deserves a rousing cheer for its frank and enlightening special report on "Material Handling in Atlanta" (November issue, page 62). We are proud to have been a part of it.

Woodrow W. Williamson Sr.
Production Manager
Armco Drainage & Metal
Products, Inc.
Atlanta, Ga.

Cancel—with regret

Dear Sir:

I am being retired from active service now and must turn my attention to other subjects for the future.

I have valued your magazine through the years as a stimulus to idea development and for its help in working out actual plans for the improvement of our

FACTORY welcomes opinions and suggestions from its readers. They help us put management problems in better perspective. Letters should be addressed: The Editor, FACTORY 330 West 42nd St., New York 36.

Lear-air
HEATLESS DEHYDRATOR
produces super-dry air (or gas)
at lowest cost...
• Regenerates only on demand
• Compact . . . Portable
• Desiccant never needs replacing
• Eliminates expense attendant to heater and freezer type driers
Lear-air

LEAR-AIR DEHYDRATORS are available with maximum capacities of 2, 5, 10 and 25 SCFM—operate on 115 volt/60 cycle alternating current.

Provides super dry air (or gas) equivalent to —150°F. dew point (1/10 part per million water vapor by volume) . . . ideal for hermetically sealed equipment and many other industrial applications. Desiccant is dried by moisture adsorption, *not heat*, and is regenerated only as air is required. No heaters, timers, or other exotic controls . . . easily installed, compact, portable. Write for catalog GR-327.

MANUFACTURERS OF: SERVOS, ACTUATORS, CLUTCHES, CONTROLS, INSTRUMENTATION, AND HYDRAULIC SYSTEMS.

Lear

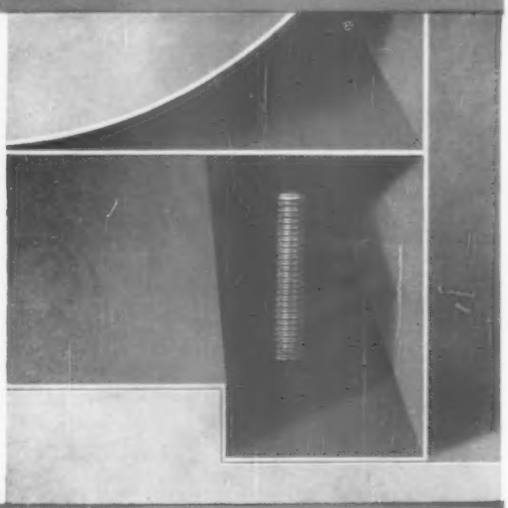
industrial products

ELECTRO-MECHANICAL DIVISION

110 Ionia Avenue, N.W., Grand Rapids 2, Michigan

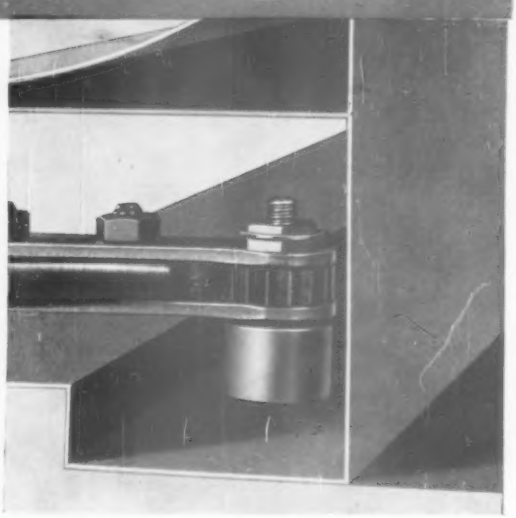
For more facts Circle 390 on Reader Service Card

the most difficult fastening jobs . . .



Running a nut down on a stud is a very simple job, unless the stud is confined in a deep recess where a straight tool can't reach it, and where an angle tool won't provide the necessary clearance for the stud.

. . . can be simplified with APEX Fastening Tools



In this case, you merely put an Apex bolt-clearance type socket, designed for use with ratchet wrenches, on the tool, and you'll find you're right back to a very simple nut running job.

That's the way it goes with the difficult fastening jobs . . . Nearly all applications can be handled easily and economically with one of the more than 5,000 stock types and sizes of Apex Nut Running Tools. And for those few unusual applications, "we quote promptly on specials."

If you fasten anything with nuts, bolts or screws, write, on your company letterhead please, for **CATALOG 30-A** Nut Running Tools, ¼" to ⅝" square, hex drives. **CATALOG 30-B** Nut Running Tools, ¾" to 3½" square, hex drives. **CATALOG 30-C** Screwdriving Tools.

APEX FASTENING TOOLS

SCREWDRIVING • NUT RUNNING • SPECIAL

The APEX Machine & Tool Co. • 1025 So. Patterson Blvd. • Dayton 2, Ohio

factories and their various operations.

For the present, however, it will be better for me not to have FACTORY coming to stir my interest in things I should forget. My appreciation for the work you are doing and for the help I received from it.

Arthur S. Pohl
Industrial Engineer
Oneida Ltd., Oneida, N. Y.

Capacity dwindles

Dear Sir:

In your "Ideas of the Month" column (November FACTORY, page 179) you describe our storage container as having a capacity of 60,000 pounds. It should have read 5000 pounds.

H. D. Kennedy
Powell Pressed Steel Co.
Hubbard, Ohio

► **The release alleged a 6000-lb. capacity. One of our typists—heaven knows why—added a zero.—ED.**

FACTORY

January 1961 Vol. 119, No. 1

A consolidation of Factory Management and Maintenance and Factory and Industrial Management, including Factory, and Maintenance Engineering. Published monthly by McGraw-Hill Publishing Co., Inc. James H. McGraw (1860-1948), Founder.

Executive, Editorial, Circulation, and Advertising Offices: McGraw-Hill Building, 330 W. 42nd St., New York 36, N.Y. Telephone: Longacre 4-3000. Teletype: TWX N.Y. 1-1636. Cable address: McGRAWHILL, N.Y.

Printed in Albany, N.Y.; second-class mail postage paid at Albany, N.Y., and at New York 1, N.Y. Title ® Registered in U.S. Patent Office. ©Copyrighted 1961 by McGraw-Hill Publishing Co., Inc. Quotations on bulk reprints of articles available on request. All rights reserved, including the right to reproduce the contents of this publication, either in whole or in part.

Officers of the Publications Division: Nelson L. Bond, President; Shelton Fisher, Wallace F. Traendly, Senior Vice Presidents; John R. Callaham, Vice President and Editorial Director; Joseph H. Allen, Vice President and Director of Advertising Sales; A. R. Venezian, Vice President and Circulation Coordinator.

Officers of the Corporation: Donald C. McGraw, President; Joseph A. Gerardi, Hugh J. Kelly, Harry L. Waddell, Executive Vice Presidents; L. Keith Goodrich, Vice President and Treasurer; and John J. Cooke, Secretary.

Subscription price: Available only by paid subscription. Publisher reserves the right to refuse non-qualified subscriptions. FACTORY solicits subscriptions only from production, maintenance, and management executives, and engineers in manufacturing plants.

Please indicate company connection and title on all subscription orders and forward to address shown in box below. U.S. subscription rate for individuals in the field of the publication: $2 per year; single copies $1. Canadian and foreign rates on request.

UNCONDITIONAL GUARANTEE: Our primary aim is to provide subscribers with a valuable publication. Your comments and suggestions for improvement are encouraged and will be most welcome. If editorial service is unsatisfactory, the publisher, upon written request from any subscriber to our New York office, agrees to refund the part of the subscription price applying to copies not yet mailed.

Subscriptions: Address subscription and change-of-address correspondence to Fulfillment Manager, FACTORY, 330 W. 42nd St., New York 36, N. Y. For change of address, state old and new address, including zone, and allow one month.
Postmaster: Send Form 3579 to Fulfillment Manager, FACTORY, 330 W. 42nd St., New York 36.

Invincible draws sand from conveyor trench into primary tank.

Reduces Conveyor Cleaning Costs 83⅓%

Special vented nozzle easily fits beneath conveyor pan.

This Invincible vacuum system has paid for itself in savings in less than one year. Used at Ohio Products Company to clean up spillage from the mold sand conveyor, it:

- Does the job in 4 hours instead of the 16 per week formerly required.
- Eliminates weekend work at time-and-a-half pay, thus saving the equivalent of 20 hours in weekly wages.
- Assures uninterrupted conveyor operation at this Orrville, Ohio, foundry of The Ohio Injector Company.

After castings have been made, mold sand is dumped from flasks through a grate onto a vibrating pan conveyor in a covered trench. Sand spills over the sides of the conveyor, collecting underneath the pan and along the sides of the 180-foot trench. If allowed to build up, it can impair, or halt, conveyor operation.

Before Invincible: Every Saturday, workers removed flooring over sections of the trench and used small shovels to scoop up the sand. This took 16 man-hours (equivalent to 24 hours of wages), yet it was impossible to do a thorough job.

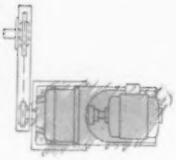
With Invincible: Night-shift worker lets Invincible do the work. Powerful suction draws sand from beneath conveyor pan and other hard-to-get-at spots. Complete cleaning eliminates a possible cause of conveyor failure, and the job takes only 4 hours. In addition, the Invincible is used for general cleaning, thereby further reducing maintenance costs.

Check the Many Uses for Invincibles. Send for new "Invincible Vacuum Equipment" folder. It describes many cost-saving applications.

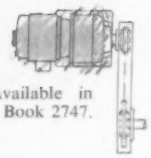
INVINCIBLE

vacuum cleaner manufacturing co., Dover, Ohio

MOTOGEARS Designed for bracket-mounting, foot-type NEMA motors of *any enclosure, any make*. Motor switching takes just minutes. No need to drain oil. Bracket assures accurate motor positioning. Book 2747.



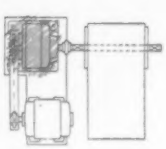
GEARMOTORS Perfect choice for close quarters! Simple gear trains and flange-connected NEMA motor combine for exceptional compactness. Available in double, triple and quadruple reductions. Book 2747.



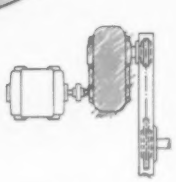
from LINK-BELT . . . industry's most comprehensive

One of these seven

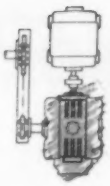
IN-LINE HELICAL GEAR SPEED REDUCERS Mount the motor *anywhere* . . . it needn't be direct-connected. And you save space with input and output shafts located on same planes. Available in double, triple and quadruple reductions. Book 2751.



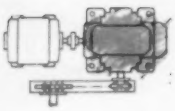
PARALLEL SHAFT SPEED REDUCERS 57 rugged, compact sizes! Built for continuous duty under the most punishing conditions. Easily withstand heavy shock loads, temporary overloads, moist or abrasive atmosphere. Available in iron and steel housings. Book 2719.



UNIVERSAL WORM GEAR SPEED REDUCERS Multiple mounting flexibility! Simple, compact design packs maximum hp in a rugged housing. Initial cost is low, mounting space requirements slight. Made with 2½, 3, 3½ and 4-in. centers. Folder 2724.



WORM GEAR SPEED REDUCERS Fan-cooled, compact, self-lubricated! Industry's *most complete* line for high-ratio speed reduction with right-angle takeoff. Single, double and helical worm gear combinations, with horizontal or vertical output shafts. Book 2824.



speed reducer line!

is just your speed

SHAFT-MOUNTED SPEED REDUCERS Install easily without special tools . . . in angular, horizontal or vertical positions with tie-rod flange mounts or screw conveyor adapter. Off-the-shelf availability. Books 2618 and 2718.

Full Layout Freedom!

With Link-Belt's broad line to choose from, you can plan *any* speed reduction setup . . . *exactly* meet your requirements for ratio, space, shaft position, shock loading and other service factors. Link-Belt's seven basic types of speed reducers—each in a wide range of sizes and ratios—give you complete flexibility in drive layout.

There's another important advantage in calling on Link-Belt for your speed reduction needs. Link-Belt makes all related drive components—chains and sprockets, bearings, couplings—all dimensionally correlated with these reducers. This one-source service assures you of a smooth-working, perfectly matched set of equipment. No alignment problems . . . no need to exchange drawings with other suppliers.

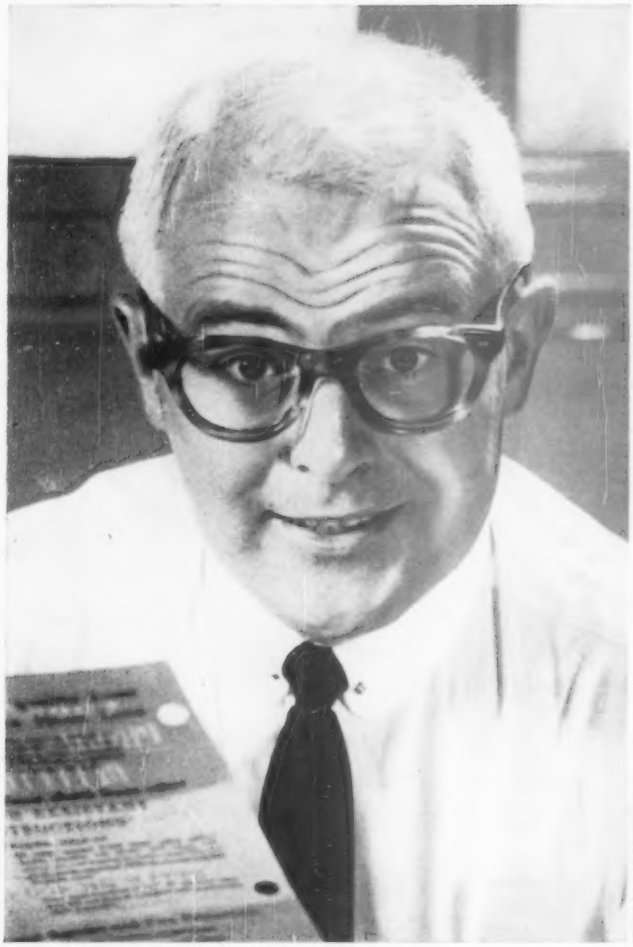
See the Yellow Pages for your nearest Link-Belt office or authorized stock-carrying distributor. Look under "Speed Reducers." Ask for any or all of the catalogs listed above.

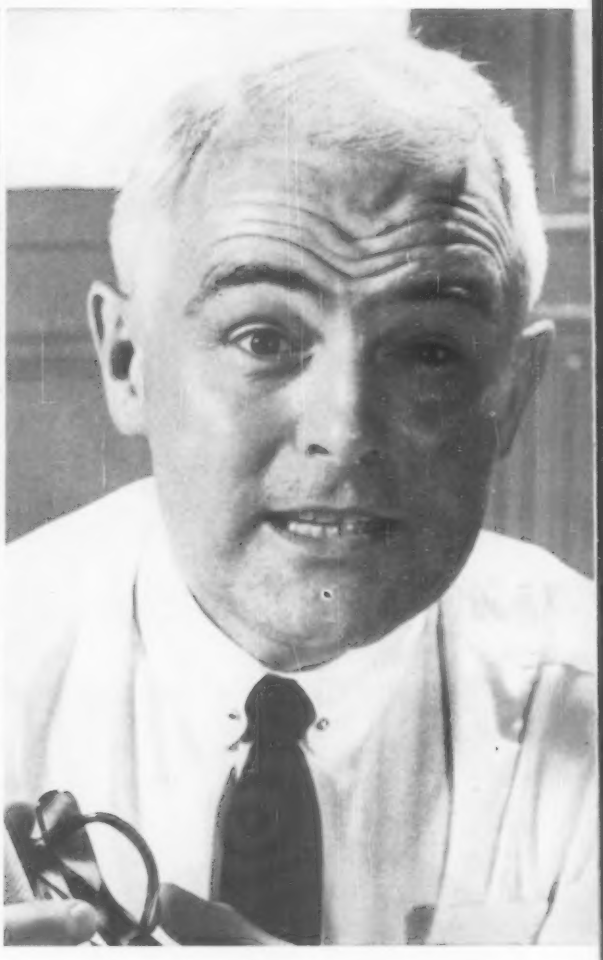
LINK-BELT

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Warehouses, District Sales Offices and Stock Carrying Distributors in all Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs; Switzerland, Geneva. Representatives Throughout the World. 15,583

GOODYEAR

Hose? Goodyear





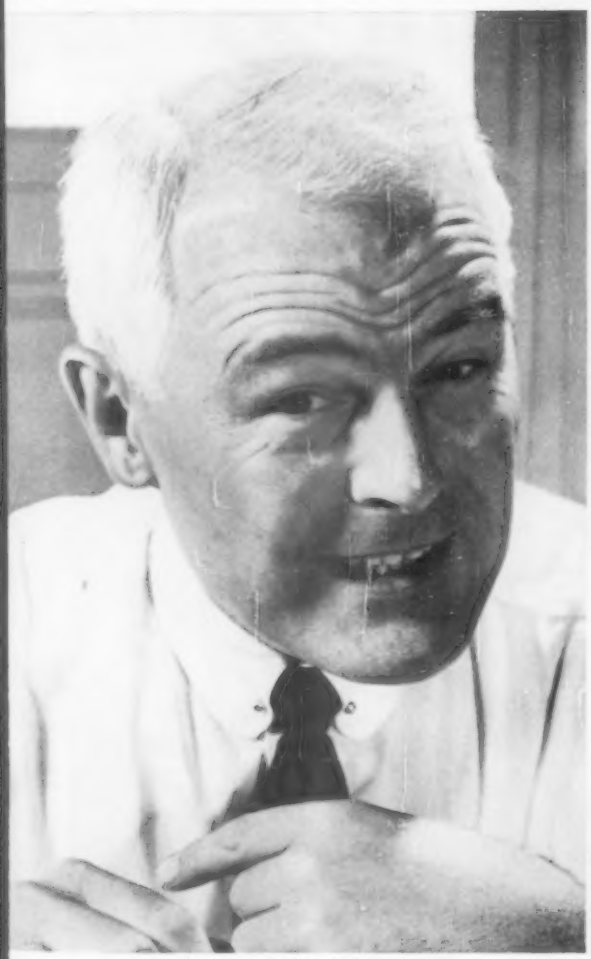
THE KIND I NEED?
(No matter how tough or unusual your application or what type hose it calls for—*Goodyear has the answer!)*

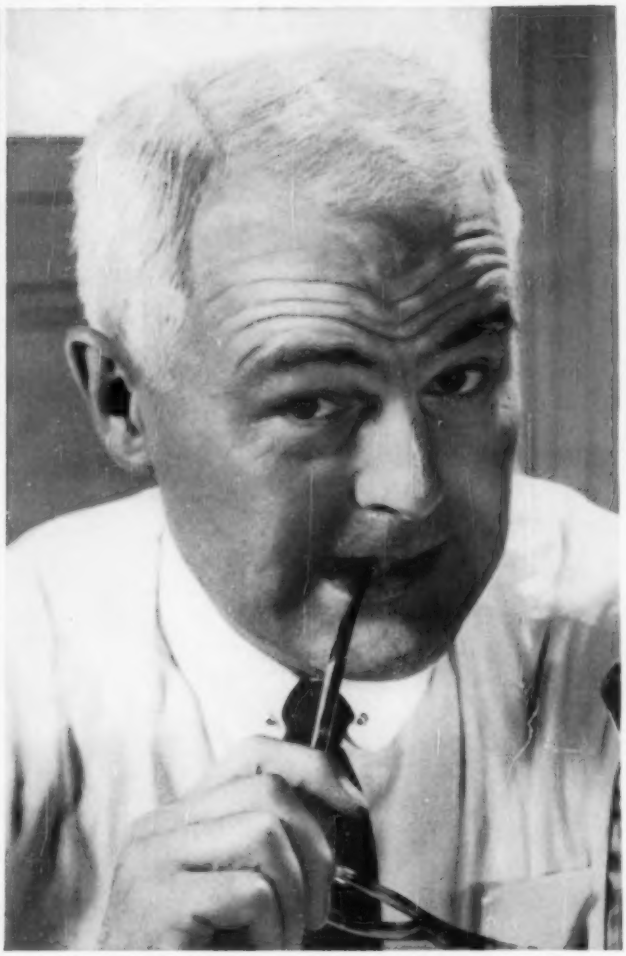
WHEN I NEED IT?
(When you need hose in a hurry—locally available right from distributor stocks—*Goodyear has the answer!)*

FOR THE RIGHT HOSE... AT THE RIGHT PLACE.
CALL YOUR GOODYEAR DISTRIBUTOR... first in

Lots of good things come from GOOD

Has All the Right Answers!





TOUGH AS I NEED IT?
(For the extra ruggedness, extra dependability and extra safety of real quality hose—*Goodyear has the answer!)*

SPECIAL HELP WHEN I NEED IT?
(Call for the advice of an expert like the G.T.M. – Goodyear Technical Man – and *Goodyear has the answer!)*

AT THE RIGHT TIME... AT THE RIGHT PRICE...
service with all industrial rubber products

Or write Goodyear, Industrial Products Division, Akron 16, Ohio

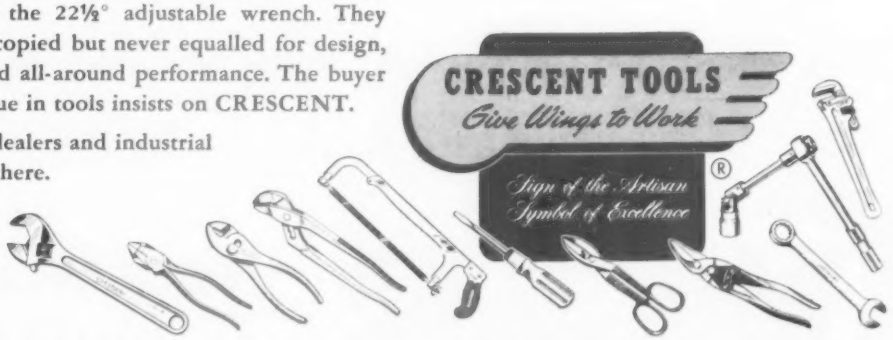
GOODYEAR INDUSTRIAL PRODUCTS

ONLY CRESCENT OFFERS THIS COMPLETE LINE!
Crescent—2 sizes, 15" and 18". Black finish.
Crescent—5 sizes, 4" to 12". Black finish.
Crestolock—3 sizes, 8", 10" and 12". Chrome finish.
Crestoloy—3 sizes, 15", 18" and 24". Chrome finish.
Crestoloy—5 sizes, 4" to 12". Chrome finish.
Crestoloy—4 sizes, 4-6" to 10-12". Chrome finish.

NONE BETTER ANYWHERE!

CRESCENT and CRESTOLOY Wrenches are made by the originators of the 22½° adjustable wrench. They have been widely copied but never equalled for design, balance, quality and all-around performance. The buyer who wants top value in tools insists on CRESCENT.

Sold by hardware dealers and industrial distributors everywhere.



Crescent is our trade-mark, registered in the United States and abroad, for wrenches and other tools. Sold by leading distributors and retailers everywhere and made only by

CRESCENT TOOL COMPANY, JAMESTOWN, NEW YORK

For more facts Circle 395 on Reader Service Card Circle 396 on Reader Service Card for items on next page

NEW Allen-Bradley Relay with EXCLUSIVE Permanent Magnet Latching

Saves Panel Space

Gives Millions of Trouble Free Operations

Holds Closed Without Coil Current

Two to Six Poles

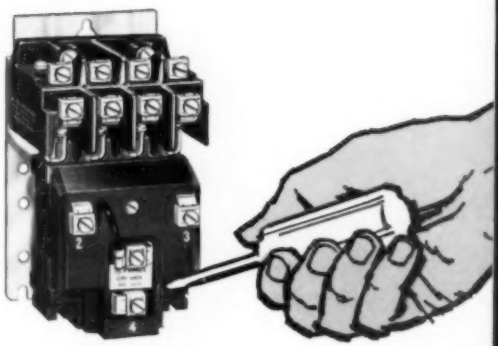
Bulletin 700 TYPE BRM

Here's a completely new "latching" relay—which does not use a mechanical latch! It is the Bulletin 700 Type BRM—built to provide the same millions of dependable operations you get from all Allen-Bradley's industrial relays. A "built-in" permanent magnet eliminates the mechanical latch and the usual troubles caused by mechanical linkages.

When the coil of the new Bulletin 700 Type BRM relay is energized, the relay closes and is held closed after the coil circuit is opened—by a permanent magnet. Energizing the coil in opposition to the permanent magnet field opens the relay. The correct polarity for operation of the relay is obtained from silicon diodes held within the molded coil cover. With no "piggy-back" additions out in front, and no "extra" solenoids below, the Type BRM relay saves valuable panel space.

These A-B Type BRM relays also feature a continuous duty coil that permits the current to be left on, if desired. As with all Allen-Bradley relays, the double break, silver contacts never need attention. And the contacts of these new magnetically latched relays afford the same 60-second convertibility of the popular Bulletin 700 Type BR relay.

For latching relay service, it will pay you to investigate this new and completely different relay. It provides the usual Allen-Bradley quality!



Can be latched or unlatched by hand

ALLEN-BRADLEY

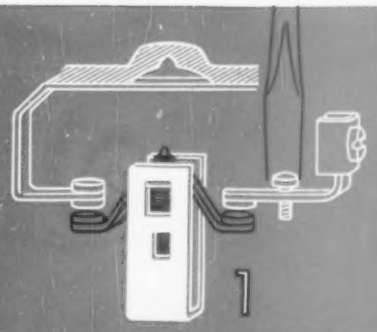
Member of NEMA

Allen-Bradley Co., 1318 S. Second St., Milwaukee 4, Wis. • In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

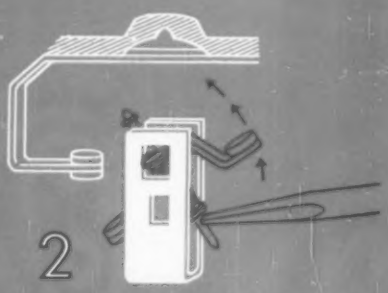
QUALITY MOTOR CONTROL

Four simple steps to contact changeover

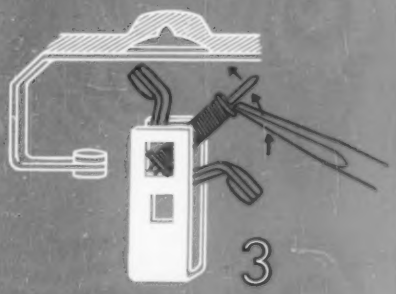
Total time—not more than 60 seconds



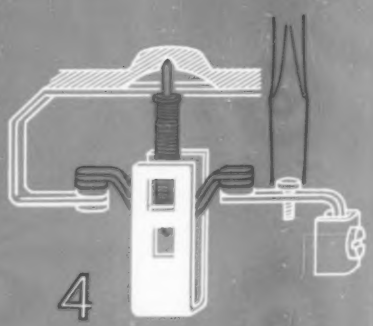
REMOVE FRONT STATIONARY TERMINAL



LIFT CONTACT SPRING AND ROTATE



DEPRESS SPRING AND TURN PIN STRAIGHT UP



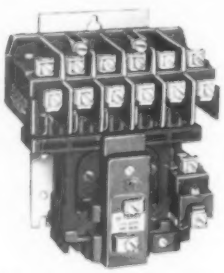
REPLACE TERMINAL IN REVERSE DIRECTION

Converts from N.O. to N.C. (or vice versa) in 60 SECONDS!

You'll be truly amazed at the ease of converting the contacts on these Allen-Bradley Bulletin 700 Type BR relays. Using only a screwdriver, as shown above, the contacts can be changed from N.O. to N.C. (or vice versa) in four easy steps—that take only *60 seconds!* Such convenient flexibility is a "natural" for reducing relay inventories.

The Type BR relays are built to provide *many millions* of trouble free operations. With the built-in permanent air gap, magnetic sticking is impossible. And the molded coil is impervious to *all* harmful atmospheres. Of course, the double break, silver contacts *never* need attention. If you use relays, there are money savings for you in the Type BR relay line!

AUXILIARY CONTACTS EASILY ADDED



Type BR relays are available with 2, 3, 4, or 6 poles—but as a valuable bonus, one or two fully rated poles can be added to the base of each relay—even in the field. It's a simple addition that takes only moments.

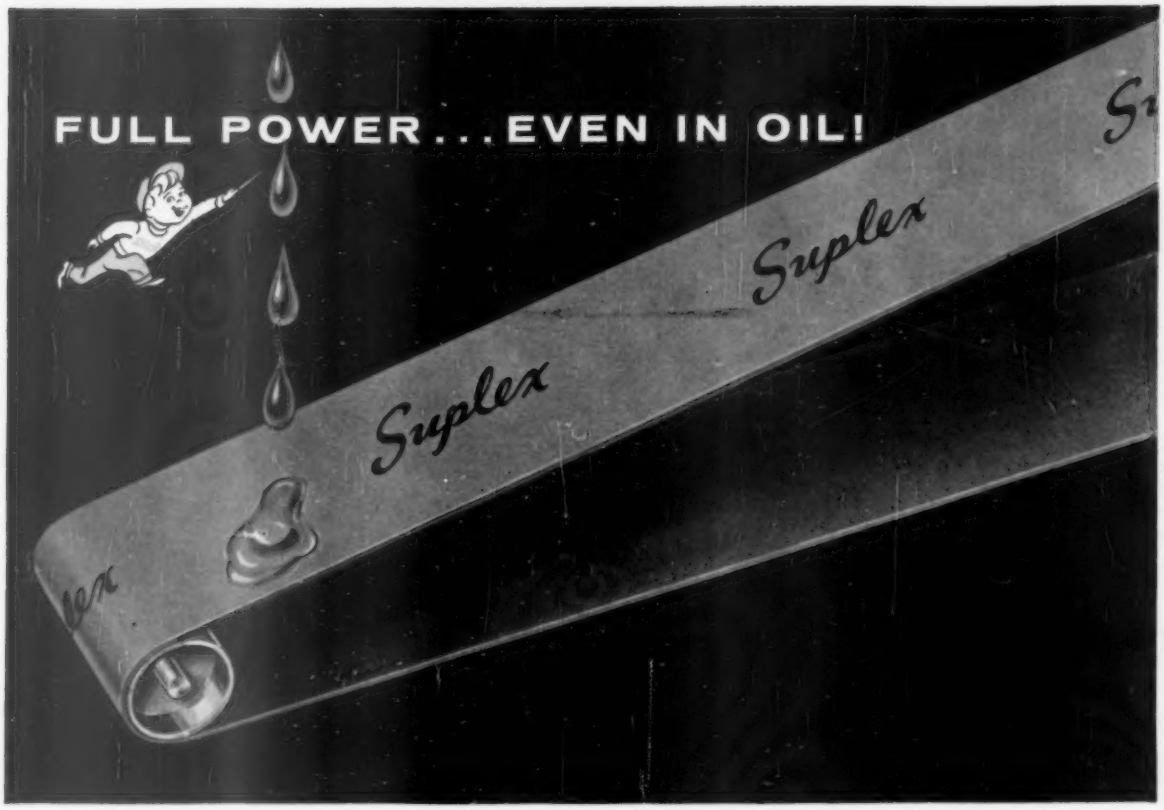
ALLEN-BRADLEY

Member of NEMA

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis. • In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

QUALITY MOTOR CONTROL

1-61-RM



NEW Dick SUPLEX oil, grease-defying BELTING

WITH EXCELLENT MECHANICAL EFFICIENCY UNDER ADVERSE CONDITIONS

ANOTHER MAJOR DEVELOPMENT FROM R. & J. DICK —
Suplex Belting has already proved a profitable find in industry after industry. With it there's no slippage or stretch in the presence of grease and oil. Loss of drive efficiency due to oily conditions, machine shutdown for belting maintenance, excessive wear on belting—all have been eliminated.

A STRONG, DURABLE, ALL-SYNTHETIC BELTING
Suplex Belting is a special, oil resistant version of our revolutionary Dixylon Belting and offers all the advantages of Dixylon: its great strength, durability, freedom from stretch . . . will run for years without take-up . . . can be used on small pulley diameters at amazingly high speeds. Available in fractional H.P. up to one thousand H.P.

Versatile, easily fitted to the drive . . . joined on the job . . . smooth, strong joints . . . made endless in minutes with simple tools.

Get All The Facts About Suplex Belting Now. Send Coupon For Catalog.

Clip and Mail

R. & J. Dick Company, Inc.
Dept. 15A, Totowa, New Jersey
Without obligation to me, please send catalog on Suplex Oil-Resistant Belting.

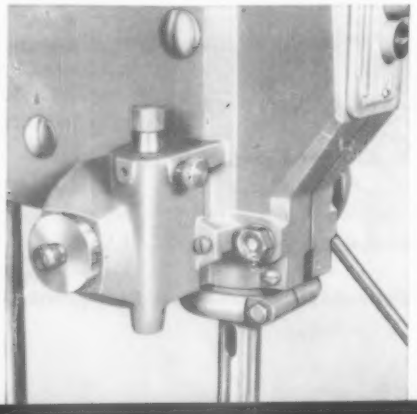
Name_____
Position_____
Company_____
Full Address_____
_____

R. & J. Dick company inc.
TOTOWA, NEW JERSEY • CLifford 6-6400
Design Leadership
CHICAGO • LOS ANGELES • SAN FRANCISCO • SEATTLE

ALL NEW Capacity—Equipped with exclusive Rockwell Power Feed (tested through 750,000 drilling cycles) the all new 17" drill presses handle many production jobs ordinarily done by costly, fixed equipment. In addition, they offer portability that can be utilized to perform extra drilling operations on limited runs or to relieve production line bottlenecks.

ALL NEW Interference-free Guard
—Tilts up and back out of the way giving operator plenty of room to make belt and speed changes quickly, easily. Three specially designed supports and a stop hold steel guard in "up" position, built-in clips automatically lock guard in operating position when closed.

ALL NEW Internal Depth Stop Mechanism—A new concept in depth stops that eliminates bottom-of-stroke quill deflection which causes excessive drill breakage and downtime. Convenient adjustment knob permits fast, one hand operation, locks in position to stop pinion shaft at same depth through repeated cycles.



ALL NEW Pivot-type Motor Mount
—Assures full release of belt tension before changing from one pulley speed to another, delivers longer belt life and eliminates possibility of damage to the belt. Maintenance of proper running tension on belt at all times prevents undue wear on bearings.

You can do more with these

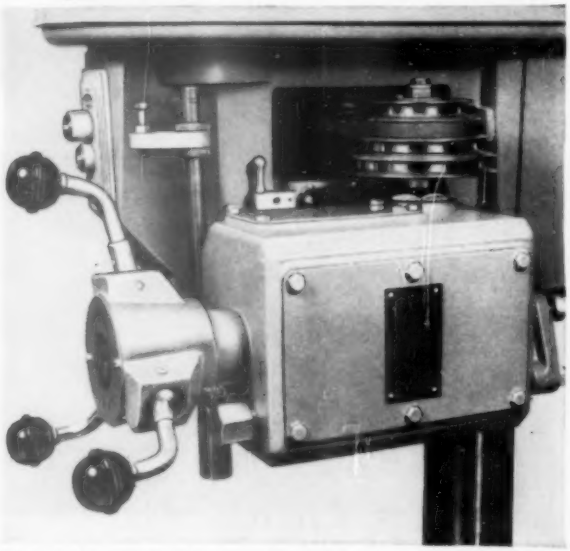
ALL NEW DELTA 17" DRILL PRESSES

Here is a major engineering advance from Delta to give you increased drilling accuracy, more job flexibility and greater operating economy. You can choose the machine best suited to your needs from 76 models in a complete line of 17" drill presses that incorporate the most up-to-date performance features available.

These drill presses are completely new—not merely improved or re-styled—but actually re-designed to deliver consistent precision operation under the most rugged work loads with little or no maintenance.

With the introduction of this all new 17" drill press line, Delta continues to provide the high quality of product that has made it the leading name in drill presses for over 31 years. Your Delta Industrial Distributor (listed under "TOOLS" or "MACHINERY" in the Yellow Pages) will gladly demonstrate how these 17's can save you dollars, hours and material. Why not call or see him soon!

FREE BROCHURE—Complete specifications and details on the full line of all new 17" drill presses and accessories. Simply write: Rockwell Manufacturing Company, Delta Power Tool Division, 628A N. Lexington Ave., Pittsburgh 8, Pennsylvania.



ALL NEW Rockwell Power Feed—Available as original equipment or as an accessory on every model, this advanced development in mechanical power feeds gives you: a front mounted pilot wheel for one hand operation and "flick of the wrist" control of feeding; infinitely adjustable drill point pressure and a built-in feature that permits remote control. For semi or fully automated operations, power feed can be electrically, hydraulically, pneumatically or mechanically interlocked with other machines.

CHOOSE FROM 76 MODELS

Selection includes: floor, bench or multiple spindle machines equipped with standard or production table, standard or Rockwell Power Feed, key chuck or tapered spindle, high or slow speed.

DELTA INDUSTRIAL TOOLS

another fine product by

ROCKWELL

For more facts Circle 399 on Reader Service Card

Remote unit reports progress
Located in the Sales Department, this remote inquiry station has a direct line to the RAMAC unit on the floor below. When a customer order number is keyed into this station, an up-to-date status report is *immediately* printed out on the automatic typewriter.

Keeps an eye on production
Final assembly and testing of these Cramer timing controls are typical of the many precision operations carried on in the plant. Each involves a large number of small parts which are produced, stocked and assembled under MOS control.

Gets information fast–Mr. J. T. Kennedy, Treasurer, checks with operator of the IBM RAMAC 305 Data Processing System–the heart of Cramer's Management Operating System. Disk file at rear stores and continually updates all operating records–each immediately available on demand.

Management Operating System at Cramer Controls Corporation

...improves delivery and reduces inventory
...with an increase in sales of 60%

Cramer Controls Corporation, Centerbrook, Connecticut, manufactures precision timers and control instruments. They consider their IBM Management Operating System a *highly profitable investment.*

To this progressive company, with 330 employees and annual sales of around $4 million, IBM data processing is an essential part of management control. It has helped them cut costs...reduce inventories... improve profit margins...speed customer service. And it has done all this while handling a 60 per cent increase in sales and reducing delivery time by five full days.

Built around the IBM RAMAC® 305, the system at Cramer uses modern data processing techniques to *inter-relate* the six major control functions: Sales Forecasting, Materials Planning, Inventory Management, Plant Scheduling, Work Dispatching & Operations Evaluation.

How MOS works to cut costs

Complete data for each major operating function is stored in your data processing system. There, past and present sales trends and forecasts are combined to produce a more complete "finished product" plan which automatically...

- determines material requirements
- checks these requirements against inventories
- allocates stocks to assembly needs
- polices inventories for under- or over-stocked items
- initiates stock-replenishing orders as needed

The sequence continues through scheduling, dispatching and operations evaluation. Continually updated cost and performance figures keep management informed of every phase of production.

Any change entered into the system is automatically reflected in all other control data. The compensation is made according to a prearranged plan—*your* plan—so that all controls are working toward your *current* objectives.

MOS offers comprehensive control

Only with the total approach provided by MOS can you get such coordinated effort, such complete information, such tight operational control. Only with MOS can you study, *in advance* the effect of decisions yet to be made. For more information, call your local IBM office.

IBM® DATA PROCESSING

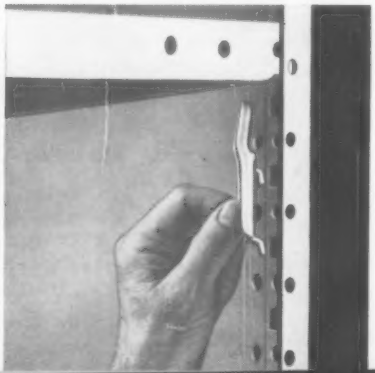
For more facts Circle 400 on Reader Service Card

WILSON SPORTING GOODS CO., the Nation's leader in the manufacture of sporting goods equipment, used Republic METAL LUMBER in constructing 35,136 cubic feet of custom-built storage at the River Grove, Illinois, distribution center. Racks can be unbolted, bin sizes changed, intermediate pallet rests installed, quickly and easily to meet changing storage requirements.

SMALL SECTIONS OF METAL LUMBER were used as hold-down brackets to anchor the framing to the floor. No wasted material. Republic METAL LUMBER is ideal framing material for building strong and sturdy work benches, cat-walks, ramps, ladders, and other framing assemblies tailored to your specific needs. Bonderized finish reduces maintenance costs, too.

REPUBLIC NYLOK® SELF-LOCKING FASTENERS provide a single-unit answer to vibration and shock. Permanent nylon insert forces mating threads together for maximum holding power in any position. NYLOK fasteners are non-galling, require no lubricants. Send for literature.

REPUBLIC CLIP SHELVING is designed to ease and speed erection, to provide quick rearrangement of parts without disassembling the unit. Strong, sturdy, rigid installation every time. Compression type clip securely holds shelf in place without bolts or special adapters. Write today.



REPUBLIC MATERIAL HANDLING UNITS save time, simplify stack, store, ship operations. Heavy duty stacking brackets and corrugated construction combine to deliver long, efficient safe service at low per year cost. Republic material handling specialists work with you. Call or write.

Wilson Sporting Goods Co.
stores 1,001 sizes and shapes with

Republic METAL LUMBER

. . . building product of 1,001 uses!

How to store 1,001 different items of different sizes, different shapes, was solved by the Wilson Sporting Goods Co. by using Republic METAL LUMBER in designing a modern distribution system at their River Grove, Illinois, plant.

Wilson set up a high ceiling (22 feet), live-storage area, uncluttered by partitions and served by lift trucks. Just over four miles of .104 gage Republic METAL LUMBER was used in constructing 35,136 cubic feet of storage space, 612 feet of racks 16½ feet high, bins 3- and 4-feet deep.

According to Wilson's warehousing experts, this system gives them more usable storage space, plus safety for both men and merchandise. The hazards of pallet-load piled on pallet-load of the old system were eliminated.

METAL LUMBER is easy to use. Simply measure, cut, assemble. Engineered pattern of slots speeds erection, reduces time and material costs. Available in two gages, two widths, in standard bundles of 10- or 12-foot lengths. Call your Republic representative. Or, send coupon for attractive brochure.

ADDED STRENGTH was achieved by splicing small lengths of METAL LUMBER to framing members. METAL LUMBER is never obsolete. Its cut-and-join simplicity makes quick assembly possible even with unskilled labor. Its reusable features further reduce costs. Republic METAL LUMBER may be your answer to difficult framing problems. Try a bundle and see.

WILSON'S SOLUTION to more storage space was a pallet rack system constructed of Republic METAL LUMBER. An overhead trolley chain running around a perimeter aisle pulls floor trucks to the main aisles. Lift trucks are used to stack and store, and load and ship orders from the more than 1,000 different items on the shelves. Service, efficiency, economy.

REPUBLIC STEEL

World's Widest Range
of Standard Steels and Steel Products

STRONG . . . MODERN . . . DEPENDABLE

For more facts Circle: 401 Metal Lumber, 402 Clip Shelving, 403 Material Handling units, 404 Fasteners

REPUBLIC STEEL CORPORATION
DEPT. FA-1502-A
1441 REPUBLIC BUILDING · CLEVELAND 1, OHIO

Please send more information on the following products:

☐ Republic METAL LUMBER® ☐ Clip Shelving
☐ Republic Material Handling Units
☐ NYLOK Fasteners ☐ Bolts ☐ Nuts ☐ Both
☐ Have a representative call

Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____

FOR VOLTAGES OF 600 OR LESS

There's a *Safe and Dependable* BUSS Fuse or FUSETRON Fuse to fit the needs of every user...

...AND FUSES PROVIDE THE HIGHEST DEGREE OF PROTECTION AVAILABLE

Unlike mechanically operated devices, fuses have no hinges, pivots or contacts to stick or get out of order. They require no periodic inspections, recalibration and corresponding down-time. A fuse is just as safe and accurate 20 years or longer after installation as it is on the day installed.

Buss LOW-PEAK Fuses
200,000 amp. interrupting capacity . . . great current limitation . . . plus long time-lag.
Ask for Bulletin LPCS

FUSETRON dual-element Fuses
All purpose protective device for circuit, motor or equipment protection.
Ask for Bulletin FIS

Buss Hi-Cap Fuses
For loads above 600 and up to 6,000 amps. 200,000 amp. interrupting capacity, —plus current limitation.
Ask for Bulletin HCS

Buss LIMITRON Fuses
High interrupting capacity fuses with exceptional current limitation.
Ask for Bulletin HLS

BUSS makes a complete line of fuses for home, farm, commercial, electronic, electrical, automotive and industrial use.

Buss Super-Lag
Renewable Fuses
Lowest cost protection where periodic short-circuits are frequent.
Ask for Bulletin RCS
Buss
One-Time Fuses
Low cost, safe protection for heating or lighting circuits where faults do not exceed 10,000 amp.
Ask for Bulletin NCS
Buss
Clear Window
Plug Fuses
One piece body and "safety" design guarantee protection.
Ask for Bulletin WUS
Buss
FUSTAT Fuses
Fusetron fuses with Type "S" base resist overfuseing or tampering.
Ask for Bulletin SCPS
Fustats for motor protection.
Ask for Bulletin SMPS
FUSETRON
dual-element
Plug Fuses
Safely stop needless blows. Give full protection against short-circuits and overloads.
Ask for Bulletin TCPS
BUSS
and FUSETRON
Small Dimension Fuses
and Fuseholders
For the protection of all types of electric and electronic devices.
Ask for Bulletin SFB
Get the Facts... write
Bussmann Mfg. Division, McGraw-Edison Co.
University at Jefferson, St. Louis 7, Mo.
FUSETRON
BUSS
McGRAW EDISON

For more facts Circle 405 on Reader Service Card

DIG HERE...behind the SPHINX
said the ARCHAEOLOGIST

(specialist in ancient cultures)

Flip a switch...Weld AC or DC said the man from LINCOLN

(specialist in arc welding)

FROM the look on the Sphinx' face, we'd say the Archaeologist is about to hit pay dirt . . . and why not? Knowing where to dig is his specialty.

And, incidentally, knowing where to dig to solve welding production problems is a specialty of LINCOLN Field Engineers. And that pays off for his customers!

Take the typical problem which existed in a Pennsylvania plant producing engines and compressors. The LINCOLN Field Engineer was in the shop on an electrode application. He noticed that the operators were constantly moving from AC welders to DC welders . . . and then moving back again. This continual changing was required in order to use the proper electrode for each of the many types of jobs . . . varying from fabricated bases to pressure piping, and from short runs to production jobs.

The LINCOLN man recommended installing "IDEALARC TM" AC/DC welders which produce either AC or DC current. The operator has merely to flip a switch on the machine to change currents. The plant superintendent was skeptical, but authorized putting in two "IDEALARCS".

Results were gratifying. Immediately, management was able to schedule any type production to these machines. The operators could weld with AC—flip a switch—and in an instant be welding with DC. Both production and morale soared. Soon, five additional "IDEALARC TM's" were installed and the production problem was solved.

That's why we say it's a good idea to do business with LINCOLN where arc welding is a specialty and cost reduction comes to you as a "plus" at no charge.

THE LINCOLN ELECTRIC COMPANY

Dept. 1811 • Cleveland 17, Ohio

LINCOLN WELDERS

RAPISTAN Ideas HANDLING

RAPISTAN TAKES A "WIDE-ANGLE" YOUR TOTAL ACCUMULATION AND

Have you counted your warehouses lately? Not to inventory the items in them — but to identify them, wherever they may be found in your operations?

Counting warehouses is not as far-fetched as it may sound. Although most businesses readily recognize two or three warehousing areas — shipping, receiving and central storage areas, for example — this is only part of the story.

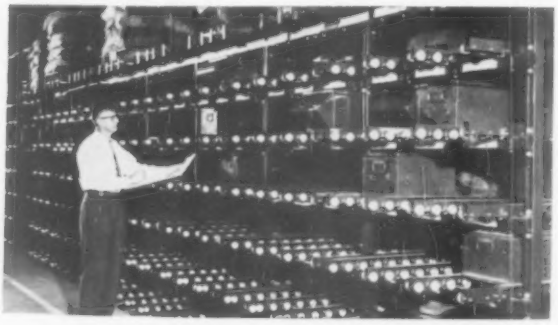
When the flow of materials through any plant is analyzed, build-ups of work are frequently found before and after many operations. Regardless of the volume of material involved, these constitute real warehousing problems that may be costing you more than you realize.

By streamlining and simplifying the operation of your major and "hidden" warehouses, you can gain better utilization of space and control of inventory, assure first-in-first-out use of materials, cut down on spoilage and damage costs, and cut out much lost time and wasted motion.

This method of parts storage is typical of many manufacturing plants. All the parts needed at this part of the line are here, if the workers can find them. Rapistan warehousing principles treat such build-ups of material as true warehousing problems.

(Below) Optimum quantities of all parts needed at the same assembly station now are stored in Live Storage Flow Racks, loaded from service aisles. No time is lost in walking and searching — no interruptions for delivery of supplies.

This central storage area (above) is typical of many industrial plants. Stacked bins and boxes defy efficient handling. Wide aisles required by lift trucks waste additional floor space. Rapistan warehousing principles (below) reduced the floor space of this central storage area by 4,500 sq. ft. and added 10,000 more sq. ft. of storage capacity. Parts now stored in Rapistan Flow Rack are instantly accessible; inventory control is simplified, and FIFO use of stock is automatically enforced. Space is used to the full cube capacity.



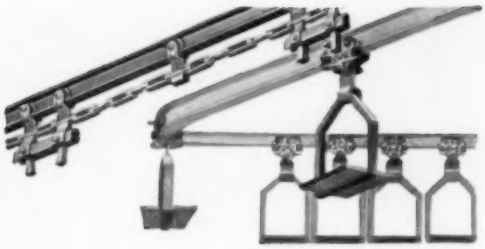
CONSIDER TIME ELEMENT, TOO

Goods need not remain at rest for days or weeks to constitute a true warehousing situation. In modern concepts of efficient handling, where accumulation must be closely coordinated with other functions of the flow system, warehousing problems can result from materials being stopped or stored for as little as a few minutes. In fact, since such short-term stop-overs usually involve frequent rehandling, rapid turnover can be more costly than long-term storage would be.

MAKE MATERIALS "CONVEYABLE"

The "condition" of the materials to be handled also has a relationship to your accumulation problems. In many situations, the key to gaining the advan-

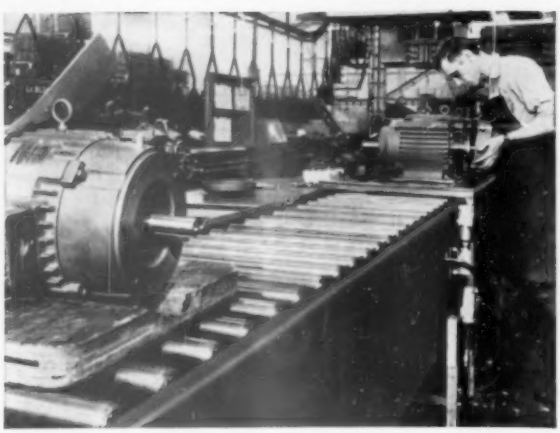
VIEW TO SOLVE MOVEMENT PROBLEMS



tages of live storage for "problem" parts is to place them in a "conveyable" condition.

If you've rejected the application of advanced warehousing principles to the storage of certain items because of their size, shape, weight or handling requirements, you may be denying yourself cost savings that could be yours. Simple, low-cost standardized containers may allow you to store such materials on wheels or rollers, where they belong, for reduced handling and easy accessibility. Low-cost pallets, tote boxes, and trays or simple carriers for overhead trolley conveyor, often can serve as suitable containers for even the most unwieldy objects.

Your Rapistan engineer is trained to look beyond the obvious, recognize accumulation problems wherever or whenever they exist. He will recommend practical solutions that promise profits in lower-cost, more efficient handling methods. If you'd like to see some examples of how Rapistan's modern warehousing techniques and coordinated handling systems have paid off for others — manufacturers, wholesalers, retailers and service industries—send for this "Handbook of Materials Handling Ideas."

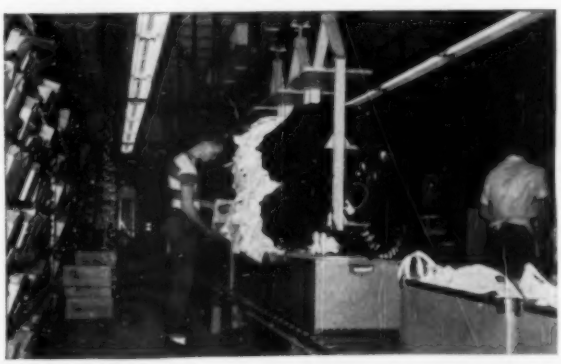


Heavy generator parts in this plant are "warehoused" for short times at several points in the progressive assembly operations. Low-cost wooden pallets serve as standardized containers for these otherwise "non-conveyable" objects.

POWER and FREE is a complete and versatile overhead flow system

Rapistan Power-and-Free conveyor systems give you full-time control of materials in motion on overhead conveyor. You can automatically direct the flow of goods or parts to work stations, accumulation points, into temporary or long-term storage — and recall loads selectively whenever and wherever needed for most efficient materials flow.

Overhead Power-and-Free conveyor can be integrated into an existing or new floor-mounted conveyor system, as in this garment manufacturing plant. This is a transfer area, where materials are unloaded from the overhead "free" line to containers on the floor conveyor.



Even when different time cycles are involved for individual processing operations, Rapistan Power-and-Free lets you coordinate and control the entire flow pattern for maximum efficiency. Many manual handling operations can be eliminated or made more efficient, by a simple, trouble-free Rapistan Power-and-Free overhead conveyor system.

For information on Rapistan Power-and-Free Conveyor in industrial processing and warehousing applications, write for this new illustrated brochure.

Rapistan®

CONVEYING EQUIPMENT

The RAPIDS-STANDARD COMPANY, Inc.

540 Rapistan Building, Grand Rapids 2, Michigan

Square D Company, Milwaukee, Wisconsin

Western Electric Company, Inc.,
Baltimore, Maryland

Gray Tool Company, Houston, Texas

INDUSTRY DEPENDS ON

Increased productivity, lower employee turnover, reduced absenteeism, improved machine efficiency, better quality control — all these and more often are possible in modern industrial plants that have a closely controlled thermal environment.

Johnson Pneumatic Control Systems have a notable record for providing dependable, trouble-free operation of all types of industrial air conditioning, heating, and ventilating systems. Thousands of leading plants such as those shown here depend on specially planned Johnson Systems to meet their individual temperature and humidity control requirements.

Johnson manufactures the most complete line of pneumatic controls for solving any problem of temperature, humidity, or pressure control. And, to make certain that each installation continues to perform up to expectations, Johnson maintains the largest and most experienced service organization in its field.

Ford Motor Company,
Mercury Assembly Plant,
Rosemead, California

Motorola, Inc., Phoenix, Arizona

Caterpillar Tractor Co., Denver, Colorado

JOHNSON PNEUMATIC CONTROL

Let Johnson help provide a more productive thermal environment in your plant. Whether your problems involve comfort control or the regulation of process air conditioning, a specially engineered and installed Johnson Pneumatic Control System is the answer. Your consulting engineer, architect, or local Johnson representative can give you full details. Johnson Service Company, Milwaukee 1, Wisconsin. Direct Branch Offices in 105 Principal Cities.

JOHNSON CONTROL

PNEUMATIC SYSTEMS

DESIGN • MANUFACTURE • INSTALLATION • SINCE 1885

For more facts Circle 409 on Reader Service Card

5 Reasons why it pays to buy from Ryerson

MOST DIVERSIFIED STOCKS—Ryerson inventories include by far the widest range of types, shapes and sizes available anywhere.

FAST SERVICE—A combination of varied stocks, modern equipment and an experienced staff means stepped-up processing for *regular requirements* and unparalleled ability to meet the most urgent *emergency needs.*

HIGHEST QUALITY—New quality-control standards, completely detailed and published, govern every aspect of Ryerson specifications and operations. Here is steel that's *certified* for dependable performance, and cut to your most *exacting* requirements.

TECHNICAL HELP—Experienced specialists, well qualified to work with you on problems of replacement and selection, help you achieve optimum value for your steel-buying dollar.

INTEGRITY—The nationally recognized leader in its field, Ryerson values your patronage much too highly to sacrifice your long-term good will for any immediate gain. 117 years of fair dealing—at your service.

LET RYERSON CARRY YOUR INVENTORY—Whatever your maintenance steel needs, you get one-call, one-order delivery at Ryerson. Order today.

METALOGICS
RYERSON PLUS VALUES

STEEL • ALUMINUM • PLASTICS • METALWORKING MACHINERY

RYERSON STEEL®

Joseph T. Ryerson & Son, Inc., Member of the INLAND® Steel Family

PLANT SERVICE CENTERS: BOSTON • BUFFALO • CHARLOTTE • CHICAGO • CINCINNATI • CLEVELAND • DALLAS • DETROIT • HOUSTON • INDIANAPOLIS
LOS ANGELES • MILWAUKEE • NEW YORK • PHILADELPHIA • PITTSBURGH • ST. LOUIS • SAN FRANCISCO • SEATTLE • SPOKANE • WALLINGFORD

For more facts Circle 410 on Reader Service Card

FACTORY PRESS TIME REPORT • JANUARY 1961

Looking ahead in business

Though the Gross National Product is expected to reach new highs, current evidence rules out any really spectacular gains in 1961. The GNP will grow to nearly $513-billion, an increase of $9-billion for the year.

The year will start with business on the downgrade. Both the GNP and industrial production, declining in the last months of 1960, are likely to dip even more in the first few months of the new year.

This slow start will mean that general business gains this year will not be impressive when stacked up against those for 1960. And, according to information available now, factory output won't equal 1960's.

•

But some key economic forces will help business improve gradually as 1961 progresses.

Government spending, for example, will be a major business plus throughout 1961. Outlays by federal, state, and local governments will rise by $6-billion. Total spending in this sector of the economy will jump to $106-billion for the year—a new record.

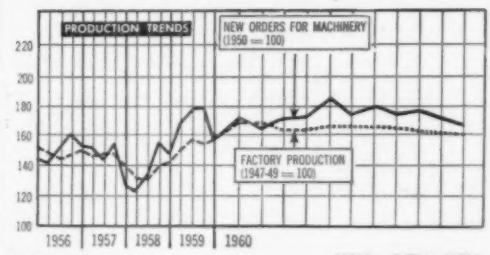
Consumers also will step up their expenditures during 1961. Outlays for consumer goods and services will rise $9-billion—to $336-billion for the year.

This increase—less than 3%—will be in spending for soft goods (food, clothing) and services (rent, medical).

Consumer spending for durable goods, on the other hand, is likely to slip substantially under 1960's level. In 1961, consumers will spend about $41-billion for durables, such as autos and appliances. In contrast, they spent more than $43-billion for these items in 1960.

The decline in durable sales actually started during the latter half of 1960. Partially, it is a consequence of a record level of installment debt that is now claiming a large share of consumers' after-tax incomes. More important, perhaps, income trends in recent months haven't encouraged continued heavy spending for durables. Declining factory output has meant unemployment or a reduced work week for many workers. Thus faced with shrinking incomes, consumers may be postponing purchases.

FACTORY FIGURES OF THE MONTH



Indicator	NOV.[p] 1960	OCT.[r] 1960	NOV. 1959
New Orders for Machinery (exc. elec.)[1]	165.0	169.0	149.0
Contracts for Industrial Construction[2]	207.0	192.0	154.0
Factory Production[3]	159.0	162.0	156.0
Consumers' Prices (cost of living)[4]	127.4	127.3	125.6
Industrial Prices (materials, supplies)[4]	127.8	128.0	128.5
Manufacturing Employment (millions)[4]	16.2	16.3	16.3
Total Employment (millions)[5]	67.2	67.5	65.6
Unemployment (millions)[5]	4.0	3.6	3.7

[p] = preliminary [r] = revised

Sources: 1. McGraw-Hill Dept. of Economics (1950 = 100); 2. Engineering News-Record (1950 = 100); 3. U. S. Federal Reserve Board (1947-49 = 100); 4. U. S. Dept. of Labor, Bureau of Labor Statistics (1947-49 = 100); 5. U. S. Dept. of Labor, Bureau of Labor Statistics.

Business investment, a strongly expanding force in the economy over the past two years, is also slated to decline in 1961. This year, business inventories will shrink by about $1-billion.

As indicated by a recent McGraw-Hill survey, business firms will also reduce their capital outlays in 1961. Some of the firms reporting are likely to revise their earlier spending estimates downward. As a result, spending may fall a bit short of the $35-billion mark suggested by the survey.

This spending pattern suggests that industrial output will decline in the early months of 1961. As measured by the Index of Industrial Production, factory output may drop from 107 (1957 = 100) for the final quarter of 1960 to 100 early this year.

But with government spending up and consumer buying in record volume, the dip in output will be brief. By mid-year, inventory cutting is likely to cease. Production should then rebound strongly.

FACTORY PROBLEM-SOLVING GUIDE • JANUARY 1961

Ideas to cut 'n' keep

THIS FILING SYSTEM is designed to give quick access to past FACTORY articles that can help you solve your current operating problems. Here's how it works:

1. All major articles (set here in bold type) and many short items are classified according to a functional code.

2. Certain articles are also coded (see numbers in parentheses) to show secondary or closely related topics.

3. To use, cut up the items below. Paste them on 3x5-in. cards, file by code number. To cross-index, copy information on a second card, file by secondary code.

For ways to use your Problem-Solving Guide and an explanation of this Decimal Filing System, write Reader Service, FACTORY, 330 W. 42nd St., New York 36.

1.0–1.4 Plant maintenance and engineering

MANAGEMENT AND PRACTICES (1.1)

1.102 Maintenance—pillar or parasite? (Jan. '61) p. 72

1.102 Repair budget spurs profits (Jan. '61) p. 76 (1.101)

1.103 Plant engineering gets place in sun (Jan. '61) p. 73

1.112 Is your plant safe from fallout? (Jan. '61) p. 233

1.113 Automatic recorder tags breakdowns (Jan. '61) p. 60

1.113 Scooters for trouble shooters (Jan. '61) p. 232 (1.11)

BUILDINGS AND YARDS (1.2)

1.204 Electrostatic cleaner ends it (Jan. '61) p. 240 (1.309)

1.207 1960 industrial buildings round-up (Jan. '61) p. 50

1.209 Industrial migration still westward (Jan. '61) p. 48

1.209 New employer shuts town down (Jan. '61) p. 118

SERVICES AND FACILITIES (1.3)

1.302 Suitcase respirator (Jan. '61) p. 234 (1.305)

1.303 Tank-car KP a cinch with this jet (Jan. '61) p. 231

1.303 Pinpointing costs (Jan. '61) p. 233 (1.305)

1.303 Custom lockers aid housekeeping (Jan. '61) p. 236

1.309 Airing out scrap problems (Jan. '61) p. 230 (1.204)

ELECTRIC SERVICES (1.4)

1.401 Updating plant telephones (Jan. '61) p. 52 (3.305)

2.0–2.4 Production

PRODUCTION CONTROLS AND SYSTEMS (2.2)

2.201 Squeezing profits out of paper (Jan. '61) p. 114

2.203 Non-destructive testing (Jan. '61) p. 61 (2.206)

2.203 Pinball machine lights up count (Jan. '61) p. 238

2.204 Data by pushbutton (Jan. '61) p. 234 (1.104)

2.206 World-wide quality control (Jan. '61) p. 42 (2.203)

2.206 Borescope looks around corners (Jan. '61) p. 234 (2.203)

METHODS AND TECHNOLOGY (2.3)

2.303 Scrap-yard feeder steps up output (Jan. '61) p. 233

2.306 Making templates fast (Jan. '61) p. 234 (2.303)

2.308 Merry-go-round jigs get the brass ring (Jan. '61) p. 239

2.311 Atomic war on costs (Jan. '61) p. 68 (2.201)

2.311 Workers sparked these cost-cutters (Jan. '61) p. 235

2.312 Tell 'em and show 'em (Jan. '61) p. 239 (3.201)

2.314 Machine memorizes mill measurements (Jan. '61) p. 238

2.320 Lazy susan welds two at a time (Jan. '61) p. 231

MATERIAL HANDLING AND LAYOUT (2.4)

2.404 Robot trains make drivers obsolete (Jan. '61) p. 237

2.404 Outside elevator breaks bottleneck (Jan. '61) p. 240

2.405 Corrugated cartons give skids the slip (Jan. '61) p. 237

2.408 Restless train lifts and rolls (Jan. '61) p. 231

2.409 Storage in miniature takes no space (Jan. '61) p. 232

3.0–3.4 Plant management

PERSONAL DEVELOPMENT (3.2)

3.202 White-collar thieves (Jan. '61) p. 238 (1.210)

3.202 Lie detector weeds out misfits (Jan. '61) p. 240

3.204 Squares in round jobs (Jan. '61) p. 118 (3.207)

3.205 Now it's automated layoffs (Jan. '61) p. 117 (3.314)

3.205 "Banana break" is monkey biz (Jan. '61) p. 117 (3.314)

3.208 School for bosses (Jan. '61) p. 232 (3.201)

EMPLOYEE RELATIONS (3.3)

3.305 Employees stir up stew (Jan. '61) p. 114 (3.306)

3.305 Boards are information centers (Jan. '61) p. 238 (3.303)

3.307 Nuts-and-bolts chef cooks lasagna (Jan. '61) p. 233

3.310 Eyes saved are dollars saved (Jan. '61) p. 80 (3.312)

3.311 Old timers get new lease on life (Jan. '61) p. 57 (3.307)

3.312 Safety story at a glance (Jan. '61) p. 232 (3.305)

3.312 Safety police look behind accidents (Jan. '61) p. 239

3.313 International ideas (Jan. '61) p. 233

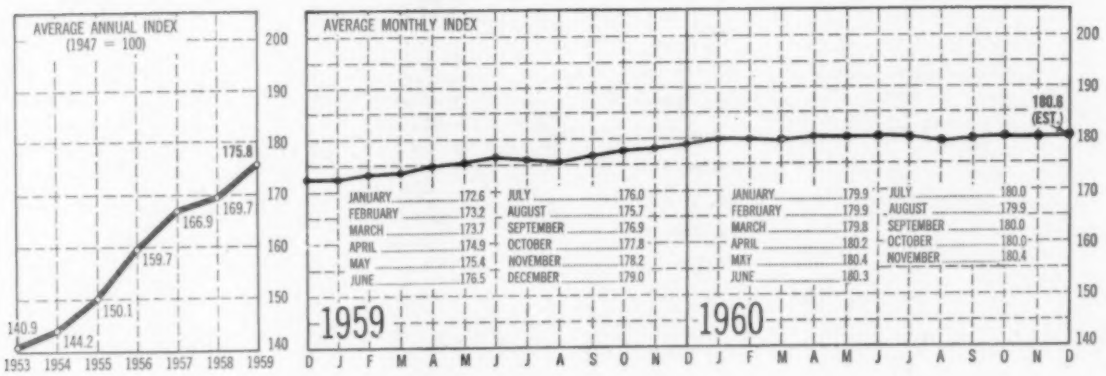
3.314 More leisure (for moonlighting?) (Jan. '61) p. 114

LABOR COSTS (3.4)

3.403 The phantom job opening (Jan. '61) p. 236 (3.314)

FACTORY PRESS TIME REPORT • JANUARY 1961

Cost index of plant maintenance



Index rises slightly

The first wage increase in several months appears as an omen of things to come.

Pushed by increased labor costs, FACTORY's Cost Index of Plant Maintenance rose 0.4 of a point in November. All manufacturing labor (carpenters, painters, and general factory workers) took home larger pay checks in November than they did during the previous month. And as we move into the early months of 1961, a further slight upward pressure on wages can be expected.

Materials costs continued on the indecisive course they have followed throughout most of 1960. The prices of materials in the equipment component of FACTORY's Cost Index were down slightly, but materials prices in the building and facilities component were a shade higher than they were in October. Copper tubing in November registered the largest single change in price of all the individual materials. The index of copper tubing prices jumped 21.4 points to 146.7 (1947 = 100). All other price changes were relatively moderate. For example, the index of millwork prices rose 0.3 of a point, while valves and fittings eased 1.0 point, and non-ferrous alloys sagged 1.4 points.

Although November's higher labor costs show up glaringly after several months of stability, the hikes in labor charges were not unexpected.

The index of electricians' wages rose 2.0 points and painters' wages 3.5 points. This pushed labor charges in the building and facilities component of FACTORY's Index 1.8 points higher. In the equipment category of the Index, labor cost changes were offsetting, which meant total labor costs there were essentially unchanged.

	AVERAGE 1959	NOV. (Preliminary)	OCT. (Revised)
Building and Facilities Index	**166.5**	**171.4**	**170.3**
Materials	142.3	138.3	138.2
Brick	152.5	155.5	155.5
Elec. fixtures	129.0	130.9	130.9
Elec. switches, boards, fuses	185.6	179.6	179.8
Elec. wire, copper	138.9	139.0	148.7
Glass	152.0	147.7	147.7
Gutters, spouts, ducts	178.0	180.4	180.4
Gypsum products	140.8	140.9	140.9
Heating equipment	127.7	124.3	125.2
Lumber	134.5	121.5	123.4
Millwork	155.7	155.6	155.3
Paint	130.1	130.2	130.2
Pipe, cast iron	170.4	170.4	170.4
Pipe, steel	190.9	183.7	188.7
Pipe & tubing, copper	154.1	146.7	125.3
Roofing	123.7	113.2	113.2
Sanitary fixtures	155.6	161.8	161.8
Sash, metal frame trim	140.9	136.8	136.5
Solder	124.1	124.4	123.9
Steel, structural	236.3	236.3	236.3
Tanks, steel	138.0	139.2	139.2
Valves & fittings	166.7	163.6	164.6
Wire mesh	162.6	165.5	165.5
Labor	182.6	193.5	191.7
Carpenters	168.9	179.5	179.5
Electricians	191.1	201.6	199.6
Painters	187.9	199.5	196.0
Equipment Index	**179.5**	**184.2**	**184.3**
Materials	176.1	176.9	177.3
Abrasives	161.0	157.9	157.9
Alloys, non-ferrous	125.4	121.9	123.3
Bars & plate, steel	227.1	227.2	227.2
Bearings	164.1	155.4	155.4
Belting	157.3	164.2	164.2
Bolts, nuts & screws	225.6	223.8	223.8
Chain	184.0	195.5	195.5
Controls (electrical)	185.6	179.6	179.8
Gear-reduction units	181.7	181.7	181.7
Hand tools, mechanics	198.2	204.8	204.8
Lubricants	124.1	125.7	125.7
Motors	147.3	142.5	142.6
Non-ferrous metals	129.0	133.1	136.6
Precision tools	156.6	158.2	158.2
Pumps	194.8	196.6	196.6
Tools, cutting	172.4	188.8	188.8
Valves & fittings	166.7	163.6	164.6
Labor	181.8	189.0	188.9
All mfg. labor	179.9	186.8	185.1
Machine tool labor	184.2	191.2	192.7
FACTORY'S COST INDEX	**175.8**	**180.4**	**180.0**

FACTORY PRESS TIME REPORT • JANUARY 1961

Looking ahead in labor

The 1961 bargaining picture contains some surprises —and also some real clues on what to expect from this year's negotiations.

Major contracts covering 2-million workers will terminate during the year. The most important bargaining is scheduled at mid-year. It involves the automakers and Walter Reuther's United Auto Workers.

In addition, 1961 will find another 2.9-million workers on the receiving end of automatic pay increases under continuing long-term contracts. The average deferred increase: 8 to 9 cents.

Of the thousands of collective bargaining sessions, less than half a dozen provide the patterns that others will follow. But there are some tough issues slated for the 1961 negotiating table.

Here are the key issues and negotiations to watch:

• **Major trucking contracts in the central states expire this month.** This is the year Teamster President James R. Hoffa hopes to coordinate truck contracts from coast to coast. His negotiations for 200,000 central states drivers are the first—he'll try to make the same terms on the East and West Coasts.

• **The big four rubber producers and the United Rubber Workers have a deadline beginning in April.** Lead issue here could be the shorter work week; the union has already made gains in that direction.

• **Meatpackers' contracts expire in August.** Here negotiators will concentrate on advancing their pacts on automation.

• **Reuther's Auto Workers close up their three-year contracts with the auto industry in October.** One important issue to watch for here: the cost-of-living escalator clause. Reuther indicates he's ready to fight to keep this in the new auto agreements.

•

Deferred increases are a vital part of the 1961 bargaining scene. Workers receiving automatic pay increases will number almost a million more than workers negotiating increases. The 8-to-9-cent average pay hike helps put a floor under increases.

Biggest block of deferred pay hikes goes to some 800,000 members of the United Steelworkers union. The basic steel industry is committed to raises ranging from 7 to 10 cents an hour. Elsewhere in manufacturing, 43% of the long-term contracts provide the 8-9 cents; next most frequent increase is in the 5-8 cent range.

The time table for the deferred increases is important. In the first half of 1961, automatic pay hikes are due in transit, trade, and trucking. The latter may provide a boost for the teamster negotiations. In the second half of the year, corresponding with machinery and auto bargaining, are built-in pay advances for: aircraft in July; aluminum and shipbuilding workers in August; metalworking in September.

•

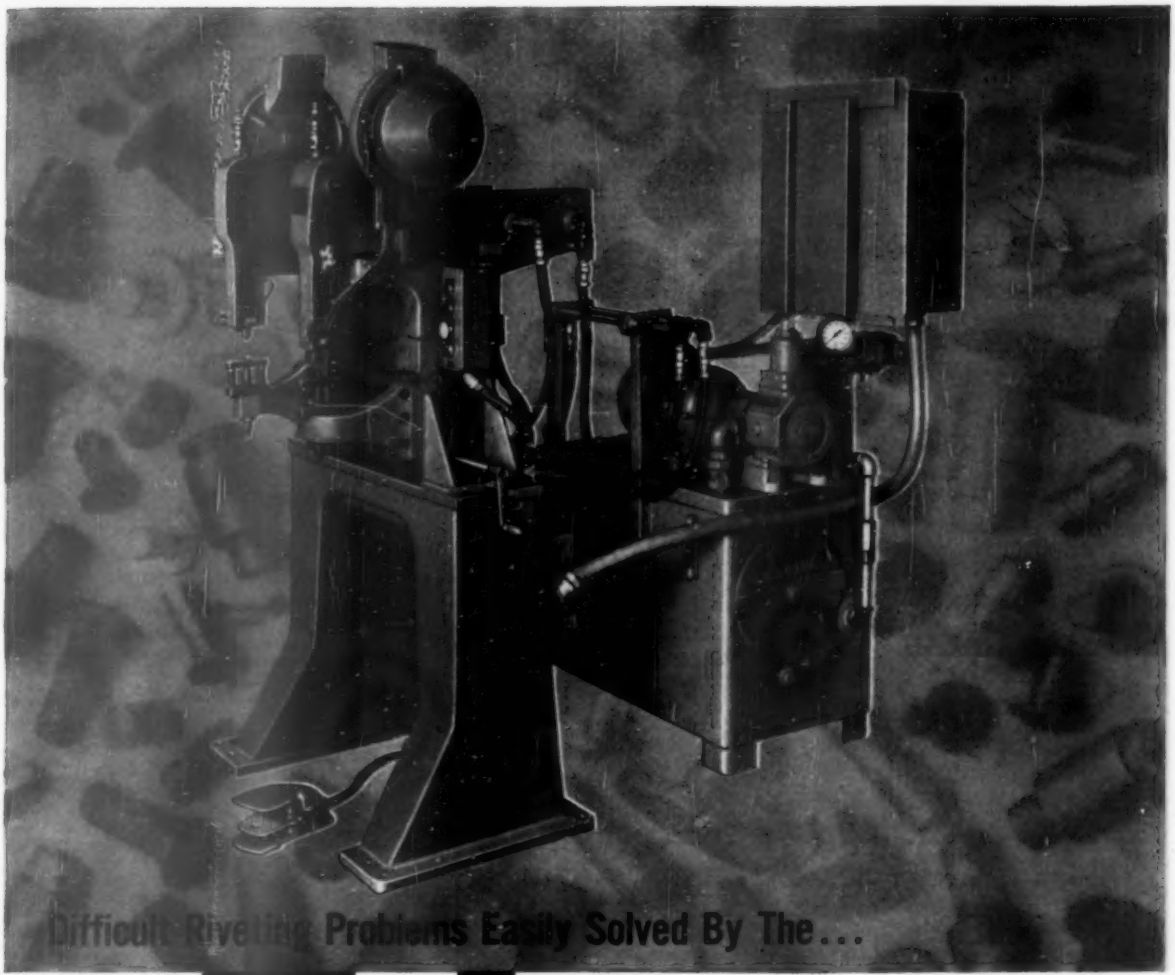
The escalator clause—tying wages to the rise in living costs—will also continue to be a big contract item throughout 1961.

However, with some 2.8-million workers covered this year, the trend is downward. Absent from the cost-of-living rolls are two major employee groups—the railroad employees and electrical manufacturing workers. In both cases, employers successfully knocked out the escalator contract clause in 1960 negotiations. Two years ago, more than 4-million workers had their pay checks adjusted with the consumers' price index.

Still, wage escalation is prevalent in many industries. For this year, 1.6-million manufacturing workers or 63% of the total have escalator clauses. In chemicals the number is 41,000 or 38%; in metalworking it's 51,000 or 76%. Non-manufacturing industries have fewer cost-of-living contracts.

Employers have long since become disenchanted with the cost-of-living clause. In the nationwide 116-day steel strike the issue was compromised. The steelworkers collect escalator raises provided the steel companies' worker insurance costs don't climb; otherwise, the pay hikes go into the insurance fund. The 1960 steel contract escalator payments are still unsettled. In some other industries, the cost-of-living climb continued. Auto workers collected four cents last year; railroad employees, one cent.

SEE LABOR RELATIONS NEWS, PAGE 193



New T-J HYDRAULIC DUAL RIVITOR

With Increased Riveting Production • Quality • Versatility

Added recently to the versatile T-J line of unit and production line riveting and clinching machines is the new Hydraulic Dual Rivitor. The Model HDR will set two ¼″ solid steel rivets at once with adjustable spacing from 1-½″ to 18″ maximum, center to center, being fed from 10″ hoppers. Operating cycle is approximately .8 second, at 420 P.S.I. oil pressure furnished from a hydraulic power unit with maximum of 1000 P.S.I. output. For complete specifications write to The Tomkins-Johnson Co., 2425 W. Michigan Ave., Jackson, Michigan for Bulletin HDR-4-59.

For information on other T-J Rivitors and Clinchors write for Bulletin No. 555.

T-J TOMKINS-JOHNSON
RIVITORS... AIR AND HYDRAULIC CYLINDERS... CUTTERS... CLINCHORS

DISTRIBUTOR DAN, the SKF bearing man, offers

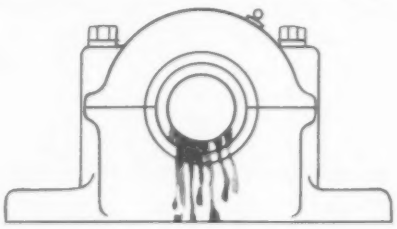
FIVE TIPS ON BEARING LUBRICATION

—that can save time and trouble for you

WHEN TO RE-LUBRICATE? Always follow the manufacturer's directions, if they're available. Most bearings, whether oil- or grease-lubricated, need cleaning and re-lubrication once a year. Re-lubricate oftener if the bearing is large, operates at high speeds or temperatures of 120-140 F. or higher.

WHAT GREASE CAN TELL YOU. Grease itself can tell you when cleaning and re-lubrication are needed. Dark grease means that oxidation has started or that abraded particles are present. Changes in the original color indicate water. Grease of a hard consistency should always be replaced.

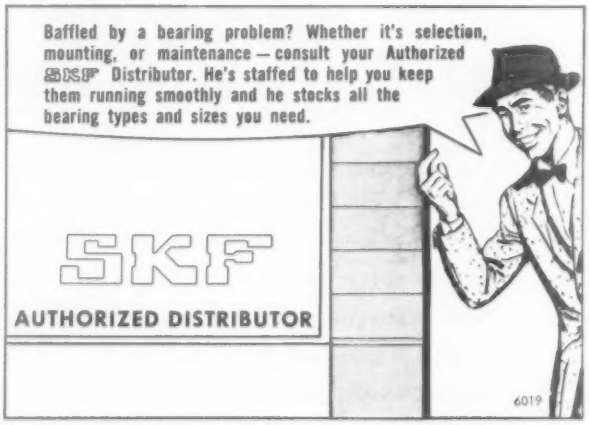
WHEN TO CHANGE OIL. Compare the oil in the bearing with unused oil. Clouded oil indicates water. Dark oil frequently indicates sediment. Dark, pitch-like coatings on the rings, roller ends or cage mean the oil has become dirty or begun to carbonize. So, clean the bearing and housing and re-lubricate.



TOO MUCH IS WORSE THAN TOO LITTLE. Don't overlubricate. Only grease that actually contacts the bearing lubricates. Using too much grease may cause churning and lead to overheating and loss of lubricant. Remember: the higher the speed, the more sensitive a bearing becomes to excessive lubrication.

CLEANLINESS, FIRST AND LAST. Clean new oils and greases will usually force-out old lubricants in the bearings. But they won't if the lubricant is badly oxidized. Pour a hot aqueous emulsion into the housing. Rotate shaft until bearing is clean. Drain solution while rotating shaft. Then, flush with hot light oil, drain and add new lubricant.

Baffled by a bearing problem? Whether it's selection, mounting, or maintenance — consult your Authorized SKF Distributor. He's staffed to help you keep them running smoothly and he stocks all the bearing types and sizes you need.



Spherical, Cylindrical, Ball, "Tyson" Tapered and REED Miniature Bearings

EVERY TYPE—EVERY USE

SKF®

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.

*REG. U. S. PAT. OFF.

Invest to save maintenance dollars

It's trite, but sadly true, that industry spends over $14-billion each year on maintenance. So true is this observation (first made by FACTORY in 1959) that plants all over the country are starting to do something about it.

Preventive maintenance, for years only a hollow catch-phrase, today is practiced to some degree in nearly 75% of all manufacturing plants. Most plants are keeping maintenance cost and control records. And these controls get sharper each year. The quality—and pay—of plant maintenance people is improving. The improvement is too slow, but it is definite. The maintenance function is applying modern management methods to its problems. Maintenance departments are slowly breaking the costly shell of craft conservatism. And many plants are mechanizing their maintenance operations with material handling equipment and power tools.

With so much evidence at hand, few will challenge the conclusion that the quality of maintenance management is improving. And, as a direct consequence, industry is getting more for its many maintenance dollars than ever before.

But there is a profit-pricking thorn in this picture of maintenance effectiveness. Despite progressive economies, in practically every plant the maintenance bill keeps right on going up. It goes up because there is more equipment to service. It goes up because most plants will pay a high price to get stalled machinery back on the line. But it goes up most of all because industry is still spending too little for replacement of obsolete production equipment.

The presence of ancient production machinery is without much doubt the single biggest factor in higher maintenance costs. The cost of maintenance follows a geometric relationship to the age of the equipment to be maintained. So just ask yourself what the average age of equipment is in your plant. Better still, ask your maintenance manager. He'll confirm the survey findings made by *American Machinist* in 1958: Over 60% of all metalworking equipment was 10 years old at that time. Every fact at FACTORY's disposal leads us to believe that the figure is even higher right now.

All the talk about manufacturing plants operating at less than 80% of capacity today should not obscure the damaging fact that some 60% of this capacity is costly to run and even more costly to keep running. It should lead you to this conclusion: The most direct road to assured maintenance savings is through investment in up-to-date operating equipment.

L. R. Bittel

EDITOR-IN-CHIEF

In Switzerland (left), precision industries use special departments for inspecting incoming materials and components. Certifying the quality of finished products is left to outside labs.

QUALITY

FACTORY'S GLOBAL SURVEY UNCOVERS THESE TRENDS:

- **Inspection groups are being organized as separate departments. One exception: Japan, where industries have their own monitors.**

- **Statistical sampling techniques are on the upswing. Foreign manufacturers share growing confidence in accuracy of results.**

- **Automatic machines for 100% production-line inspection are being installed in France and Germany.**

- **Quality control standards are moving up. In the last five years Japanese specs on transistor radios, cameras, and sewing machines have been tightened four times.**

- **Even better QC is coming. As Inner Six and Outer Seven Markets develop, lower tariff barriers will spur higher quality to combat added competition.**

CONTROL FOREIGN FIRMS CLOSE THE GAP

Lower price tags are not the only reason that Americans buy and respect foreign products. In many cases it's also quality, which is sometimes higher than in domestic products.

Foreign products have always had special appeal, based on an image of Old World craftsmanship. In part, this still holds. But the picture is changing.

Recently Singer Manufacturing Company changed assembly procedures in its German plant. The "mechanics" assembling the sewing machines had spent years learning their special skills—when only rudimentary assembly techniques were needed. As a result, the mechanic spent his time tinkering and perfecting each machine. Quality was high—but production low. Only after it was shown that trained but unskilled workers could assemble machines at twice the former rate was the German management converted to mass production methods.

Many foreign manufacturers are now as mass-production-minded as their counterparts here. But switching away from craftsman-based production required new controls on quality. Many of these controls are being patterned after those in this country. In some cases they are exact duplicates.

Emphasis on quality control (QC) in many cases stems directly from U. S. sponsorship. After World War II, off-shore procurement demanded "new" quality standards from suppliers in Germany, Japan, Italy, and France. With this as the impetus, the total quality control philosophy (see FACTORY, March 1957) is emerging around the world.

Inspection is no longer by operators. Even small companies in Britain (30-40 employees) have at least one full-time inspector. Larger companies have inspection departments, often back-stopped by roving inspectors inside and outside the plant.

Incoming materials or components are checked more closely. France is establishing an independent laboratory for standard electronic component testing, to replace statistical sampling at the receiving dock. This lab will put its stamp of approval on components before they leave the supplier's plant. In Britain, small companies still rely on the vendor's certificate, although large companies like Rolls Royce Ltd. have their own labs.

In Japan, it's the final product that receives a thorough quality check. Industry-wide monitors like MITI (Ministry of International Trade & Industry) and JIS (Japan Industrial Standards) check all exported products. This is the same type of control that Swiss manufacturers (especially of watches) have maintained for years. Reliance has been on neutral testing groups rather than on in-plant inspectors.

Despite lower labor rates, foreign manufacturers still worry about the cost of quality control. Some are beginning to back away from 100% inspection of incoming goods because of the "prohibitive cost." Germans are adopting frequency sampling tests to reduce duplication of inspection costs. Parts arriving in one department may get a second 100% inspection, just after receiving one in production.

In Rome, Autovox S.p.A., checks incoming radio parts 100%. Partial assemblies are 100% inspected with an additional 5 units per hour being spot-checked. At mounting, the radios are 100% inspected. They get another 100% inspection at final control. Just to make sure, a final super-control inspects from 1% to 2% that are ready for trucking.

This over-emphasis on quality pinpoints a basic concern: ability to compete overseas. One Italian electronics company annually studies products of U. S. competitors, but has yet to enter the market. "U. S. manufacturers are actually putting out a better product against which we can't compete," FACTORY was told.

Even the Swiss use QC as a competitive weapon. They recently imposed stricter quality controls on watches, which were being challenged in the world market by Russian exports.

In some cases, foreign methods may even have surpassed ours. A Rolls Royce engineer told FACTORY: "Flaws in a current component carried by a QC engineer on a recent U. S. trip were not detected by U. S. methods." Another British QC engineer revealed a growing attitude by his remark: "People must realize statistical control only finds faults; it does not correct them." He admitted they lag here.

Another innovation overseas is the quality label, similar to our Underwriters Labs' label, but based on quality. In Switzerland, electrical equipment and materials carry the tag of Swiss Electrotechnical Institute. In Japan, the JIS label speaks for the quality of the product. The QF (Qualité France) label guarantees replacement of any item produced by one of its 600 members, mostly small businesses.

The following country-by-country analysis shows the U. S. has no reason to think its quality control methods unique. Turn the page.

. . . QUALITY CONTROL

In Japan (left), the sharp rise in production of sewing machines has been based on good quality control. Last year's two-million machines were statistically sampled by 180 inspectors.

ITALY:

Two standards of inspection prevail. A normal but thorough inspection for the domestic market; an "ultra-inspection" for items going overseas. There is little dependence on statistical sampling.

JAPAN:

Japan has shed is reputation for poor quality products. Many are now marketed in this country under well-known U. S. trade names. Quality control measures stemming from U. S. occupation are not restricted to the export trade. Industry monitoring (JIS) protects domestic trade, too. Statistical sampling is standard operating procedure for inspecting exported sewing machines.

BRITAIN:

Jealous of its reputation for quality goods, Britain pioneered new statistical control techniques in the early 1920s—but admits it lags now in this method. A spokesman for the Productivity Council reports: "If there is a company in our country not using quality control, I don't know of it."

Double standards seem to be the rule for QC here. A spokesman for Fiat, S. p. A., the largest exporter of Italian cars to the U.S., says Fiat not only maintains a super-inspection program for units being shipped to the U.S., but also retains all the "inferior" automobiles for domestic consumption.

But this is a relative rating. At Fiat's sprawling plant at Turin, 100% quality control is maintained on all its products—automobiles to electrical appliances. Severest inspection occurs during construction. "Ultra-inspection" is saved for the final product. It's at this point that the "best" models are selected for Stateside marketing. But differences in quality between "best" and the others are relatively minor.

At the Autovox Company (Rome), maker of automobile radios, quality control is three-phased. On incoming parts bought from the outside (including the U.S.) there is 100% hand-and-eye inspection of each part before assembly. On parts manufactured within the Autovox plant there is a spot check on a percentage basis. It varies from 10% to 75%.

But during assembly there is 100% inspection of all partial assemblies. Also, every hour an inspector picks five such units and brings them to a control lab. Here they receive an intermediate control inspection of 100%. The final assembly receives similar checking. The last super-control is a 1% to 2% inspection of radios packed for shipment.

Food products get the same control as equipment, especially if they go overseas. Paolo Agnesi e Figli at Imperia maintains a staff of biologists in its labs to test quality of the product both before and after packaging. A 100% inspection of ingredients before mixing is maintained daily. In processing, a 1% to 5% inspection rate is used. The company accepts the U.S. Food and Drug Administration's rating as certification of Stateside acceptance. It has yet to have a shipment condemned by the U.S. Department of Agriculture.

Japan has made a terrific industrial recovery in 15 years. Much of its increased trade and reputation can be traced to its quality control.

QC here originated in the early days of occupation, especially after the Korean War started in 1951. Swamped with orders from the U. S. Army and Air Force, Japanese industry had to manufacture in compliance with MIL specs, including parts on subcontract.

About this time the Japanese government's Institute of Technology established JIS standards for all industries. These Japanese Industrial Standards were awarded only to those products in which at least half of every lot underwent export inspection. The JIS mark rapidly improved quality at home as well as that of overseas shipments.

The Ministry of International Trade and Industry (MITI) has revised regulations on transistor radios, sewing machines, and cameras four times in five years as quality improved.

Export inspection offices were set up in accordance with government regulations in 1955-56. Self-supporting, these offices charge less than 1% inspection fee of the FOB prices of export items inspected. Most inspection is conducted at the manufacturing firm. Small firms with less than 300 items bring their goods to the inspection office.

One of these offices, Japan Machinery and Metals Inspection Institute (JMI), has 180 inspectors in Tokyo, Nagoya, and Osaka. These men handle a total of 10-million transistor radios a year. Improved quality control throughout the plants in the last two years has reduced the number of rejects, even though standards are tighter.

Statistical sampling was also used to inspect the 1¼-million cameras produced last year—90% of which came to the U. S. The Japan Camera Inspection Institute moved into new headquarters in Tokyo last April. Of the total staff of 36, 18 are inspectors.

British manufacturers have found that inspection by processing operators is not satisfactory. Even small companies (35 employees) have at least one full-time inspector.

Inspection techniques and philosophies depend on the product. About 90% inspect total output of finished products. In special industries, such as aircraft engines and electrical and radio equipment, 100% inspection is used exclusively. Only in relatively few sections of industry is statistical sampling of final products used.

But in components the story is different. There has been a swing toward statistical sampling—even for heavily stressed components. This is due to improved statistical techniques and a growing confidence in results. But when there's the slightest doubt, there's still a tendency to switch back to 100% inspection.

The importance of controlling incoming parts and materials is recognized. Small companies rely on the vendor's certification, but large companies depend on their own labs. Some even use traveling inspection teams to check quality at the vendor's plant.

Rolls Royce, with a unique name for quality, uses rigorous standards. "We use practically every quality control method in the book," Assistant Chief QC Engineer W. G. Cook told FACTORY.

Its aircraft division relies on 100% inspection for nearly all parts. Some receive a double or triple check by different methods. A turbine disk will be flaw-tested magnetically, by etching and binocoular inspection, by fluorescent penetrant. All completed engines are run and inspected. A statistically determined number of engines are selected for full strip-down and individual parts inspection, then rebuilt.

General Electric Company Ltd., has just put in use a completely automated TV receiver production line. Despite standardized production, partial sets are 100% inspected three times during assembly.

Turn the page

. . . QUALITY CONTROL

In Germany (left), final checking of these Olympia typewriters typifies German thoroughness. Raw materials are certified by vendors, parts checked after each machining.

FRANCE:

Two important trends are noted here, but no over-all pattern of quality control. Statistical sampling is on the upswing. More manufacturers are making inspection departments independent. The electronics industry is trying to establish standard component testing by an independent lab.

GERMANY:

It had little QC before 1948, when it relied on the skill of its producing craftsmen. This influence still exists. In shops of under 50 employees (40% of the total) QC is performed by the man on the machine. But the shift is away from go-no-go checking. Within two years, 80% of QC will be statistical.

SWITZERLAND:

Traditional high quality of Swiss exports stems from an inherent national trait supported by strict quality control. Inspection departments represent a large percentage of the work force. A watch factory may have one inspector for every three watchmakers.

Quality control in France is a many-splendored thing. It ranges from the casual "looks-good-to-me" inspection by the artisan to the highly sophisticated, plant-wide system.

Electronics heads those industries using QC in France. At Compagnie Générale de Télégraphie sans Fil (CSF) over a million man-hours a year are chalked up to keeping quality topnotch. And at another French electronics giant, Thomson-Houston, nearly 20% of the people involved in missile production are concerned with quality control.

This advanced state of the art in electronics stems from off-shore demands for radar and other military equipment. These orders, starting with U. S. forces in the early 1950s, forced some companies to revise their QC methods. To meet MIL specs, the equipment manufacturers imposed standards on their suppliers, touching off a wave of improvement.

French government activity in missiles has had a similar effect, and is spurring creation of the independent testing lab for components. Teams from the lab carry out inspections in the component plants. Equipment manufacturers then accept tested lots without further controls of their own. This replaces the generally accepted statistical sampling of all materials from outside sources.

Another QC-conscious group in France is the automobile industry, now exporting every second car off its assembly lines. At Renault Ltd., for example, 1800 people work in the quality control department. Its head reports directly to the company president.

Inspection techniques in autos blanket the QC spectrum. To a considerable degree 100% inspection is followed. All parts of a car's safety characteristics are checked this way. Renault, for instance, has found that for some parts it is cheaper to build an automatic machine for 100% inspection than to check samples on a less-sophisticated basis.

The majority of German QC concepts have their roots in the U. S. Quality control within German industry had been haphazard—non-existent in nine out of ten cases. But quality demands imposed by occupying troops opened German eyes.

Previously, reliability of the designed product was evaluated before going to production. Little proof was required that the final product met specs. Now, almost without exception, all finished products are 100% inspected.

The quality control group of the Association of German Professional Engineers estimates that 50% of in-plant parts and components are statistically sampled. The balance receives 100% inspection. But in many cases this leads to duplication. It's common for subassemblies made within the same plant to be treated later as incoming materials. This 100% inspection is duplicated by final inspection. Although major firms and many small companies demand a quality certificate from their suppliers, statistical sampling is used on all incoming materials.

German managers would welcome 100% inspection of all incoming materials, but the cost is prohibitive. Instead, they have developed "frequency" sampling. Incoming parts are assigned a frequency ratio number (say one to five) based on previous performance. Should the statistical sample of every inspected lot (one in five) be higher than average, the next five lots will all be statistically sampled. All lots will continue to be inspected until a clear run of five lots is obtained.

An average 55% of the QC staff is employed in processing, assembly, and final product acceptance. The other 45% is engaged in engineering or research and evaluation.

In some plants like Borgward of Bremen, automatic on-machine checking is employed. But Borgward still uses 600 quality control supervisors to make spot checks on the production line.

This country exports from 60 to 70% of its production and has traditionally met overseas competition by high quality standards. The average Swiss prides himself on quality consciousness.

"Price plays a secondary role, both at home and on the export market," FACTORY was told by C. A. Inderbitzin, secretary of the Swiss Association of Metalworking Manufacturers. "Swiss products will continue to stand up against stiff competition because of the high quality of workmanship and materials, and their high engineering content."

Electrical equipment for export has for some time carried a test report made out by the Swiss Electrotechnical Institution. It confirms that the equipment meets required standards.

During the manufacturing process, Swiss plants follow these procedures:

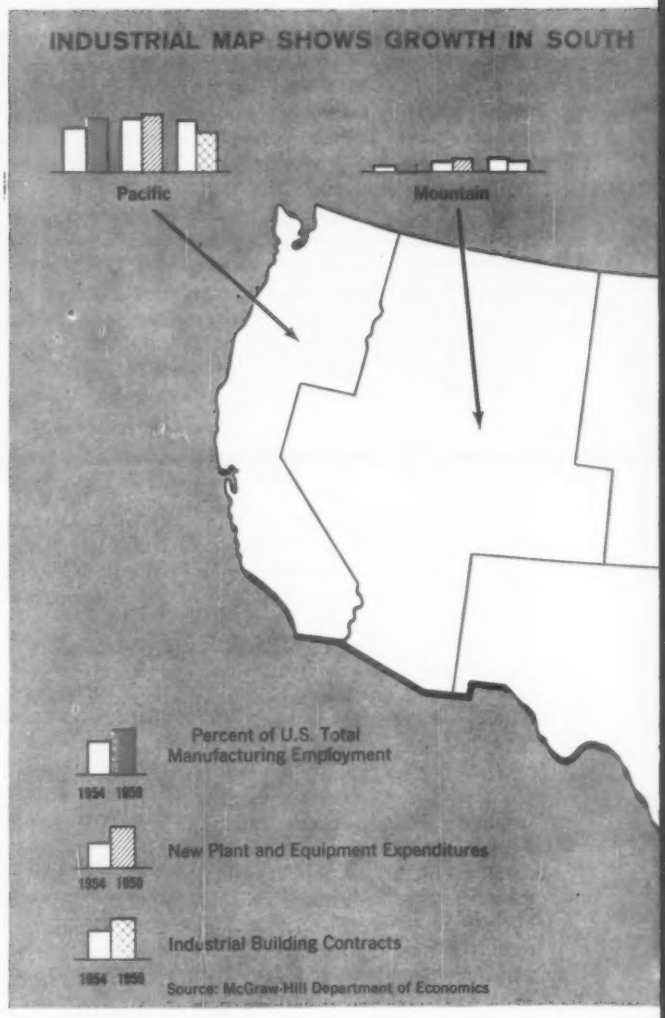
- Inspection is by separate departments. Processing operators perform functional tests only.
- Finished products are subjected to 100% inspection, with the exception of the chemical industry, which uses statistical sampling.
- Subassemblies are 100% inspected.
- Some incoming parts and components are inspected 100%; the majority are statistically sampled. Even though quality certificates by suppliers are recognized, these parts are often also checked by statistical sampling.

At the SIP (Société Genevoise d'Instruments de Physique) plant in Geneva, precision machine tools receive many checks during production. Each production area has a testing cubicle for checking components and subassemblies before they move on to the next area. All finished products receive rigorous 100% inspection. The test report of a coordinate drilling machine includes 250 individual results. And a three-coordinate measuring machine receives at least 800 checks.

Because Switzerland is a member of the Outer Seven market, emphasis on quality will be intensified.

BUMS, GIANTS, AND INDUSTRY HEED GREELEY

- Middle Atlantic, Great Lakes slip.
- Pacific is tied for third place.
- New consumer markets draw plants.
- Rapidly growing cities make room.



Like the Dodgers and the N.Y. Giants, American industry is still following the sun. The traditional Eastern manufacturing centers are steadily losing ground to the South and West. The period of greatest movement, 1947 to 1954, is over. And the last five years have seen a gradual slowing down. But it isn't the end by any means.

Transportation and power transmission are no longer a problem anywhere in the country. Raw materials are less important to manufacturing than they used to be. As a result, the consumer market has become a most important factor in the choice of plant location. And the rapidly growing markets in the South and West will continue to exert their influence for years to come.

In addition, one industry attracts others. Like support forces in wartime, they are needed nearby to supply the materials necessary to a finished product.

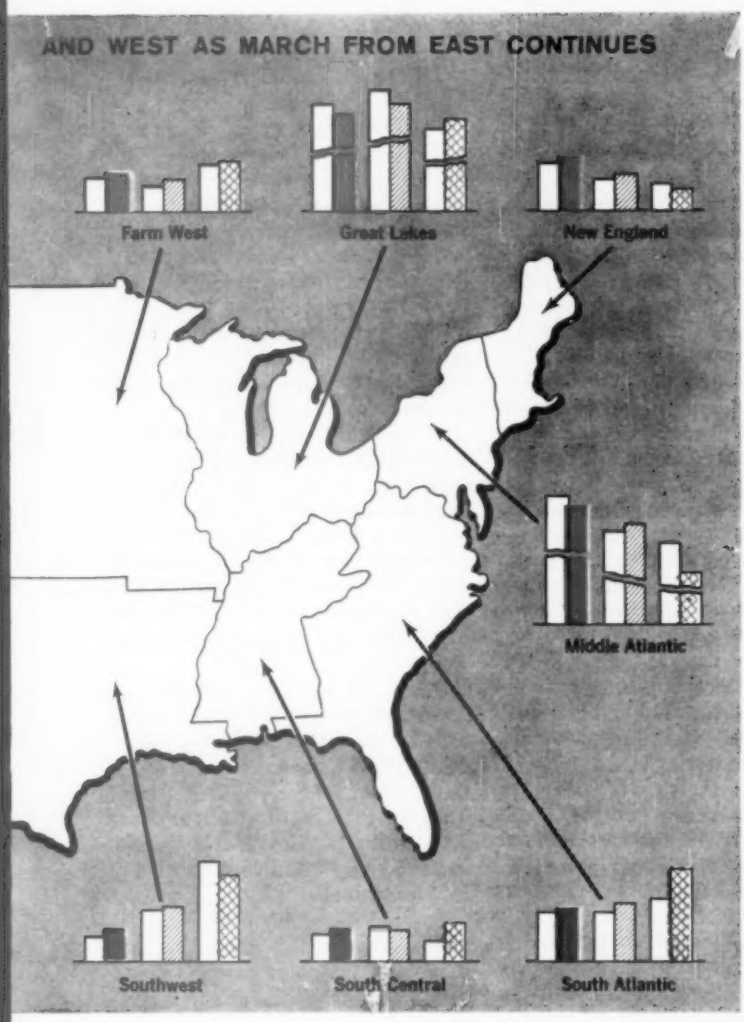
A third factor is the ability of the sprawling cities of the South and West to absorb industry, which they are doing now at an amazing rate. Not so in the East. There, a migration to the suburbs has caused the industrial importance of many of its cities to dwindle.

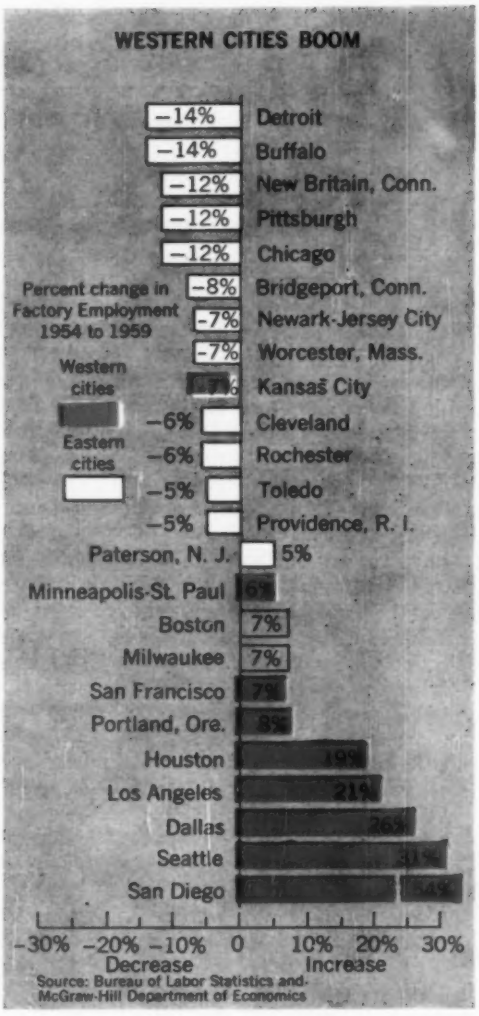
Here's the way various areas reflect the changes from 1954 to 1959:

New England: It has shown a certain amount of economic vigor. New industries, like electronics, have come in because of the area's research universities. But its consumer markets are not keeping pace with the rest of the country and any large-scale growth appears unlikely.

Middle Atlantic: This region continues to drop behind. Its share of the nation's factory employment has fallen 1.2%. Because its output is concentrated in industries that are unlikely to see more than average growth (primary metals, heavy manufacturing, and textiles), it is reasonable to expect a continued decline.

South Atlantic: The past five years have seen a vigorous, steady growth (mostly in hard goods). Present indications are that it will continue.





The Great Lakes: This area is still the industrial center of the nation despite a steady downhill slide. But the recent rise of industrial building contracts indicates that manufacturers are replacing their obsolete buildings. This is probably in preparation for the St. Lawrence Seaway and an expanding foreign trade, which ought to have a profound effect on the future.

Farm West: The groundwork is being laid here for further industrial expansion. The area's increase in new plant and equipment spending is the greatest in the country. If present growth rates continue, the farm states will surpass New England in factory employment.

South Central: This region has shown only moderate growth over a wide range of industries. But each of the four states has increased its share of U.S. factory employment.

Southwest: Here, growth is emphatic. The area's increase in factory jobs outstripped the country as a whole by a wide margin. Even though the Southwest's share of industrial construction contracts has dropped, it is still very large compared with the area's share of factory jobs.

Mountain: These states are the fastest-growing industrial area in the country. An internal rise of 33% in factory jobs increased its share of the U.S. total from 1.1% to 1.4%.

Pacific: Industrial growth here has continued on a broad front for a long time. About 70% of its jobs are in the durable goods industries. A 21% increase in employment has pushed this region into a tie with the South Atlantic states for third place and it will probably pull ahead in the future.

Taken all in all, even though industrial migration proceeds with glacial slowness, it is significant. Despite the expected impact of the St. Lawrence Seaway, the jet cargo fleets of the future, and the new highway program, predictions are that the pace of the last five years should continue for the next five.

Experts see challenge to steel's lead in plant building

Jockeying for a share of tomorrow's construction boom, they urge plant men to watch these developments in structural materials.

Despite a severe snowstorm that had crippled most of the Eastern seaboard, some 4000 industry men from across the nation gathered last month at the first Industrial Building Exposition and Congress.

On two of New York Coliseum's exhibit floors plant men saw a neat, if modest, array of industrial building products—everything from sculptured acoustical walls (Tectum) to off-the-floor packaged water coolers (Cordley & Hayes).

But for real building buffs the Congress sessions were the main attraction. There, experts offered inside dope on construction costs, site selection, and developments in major structural materials.

Commented one of the sessions' 900 registrants: "This was the first time in years I've heard the virtues of every major structural material exposed under one roof."

The materials "exposed" were: steel, aluminum, concrete, plastics.

Here are highlights of those talks:

IN STRUCTURAL STEEL

The speaker was George H. Miehls, chairman of the board, Albert Kahn Associated Architects and Engineers, Inc., Detroit.

According to Miehls, the popularity that steel enjoys today (as the basic structural material for one-story industrial buildings) will not always prevail. More than 90% of the latest industrial buildings have a structural frame made of steel.

"Neither the steel industry nor the engineer can assume this ratio will continue," Miehls remarked. "In the competitive market that exists today, it means that any number of projects that normally would be constructed with structural steel will be given sound screening in competition with other materials—notably, reinforced concrete—poured in place, precast, prestressed or post-tensioned."

Miehls said that steel makers are hard at work developing new products and construction methods to meet the challenge of competition.

He pointed out that new (ASTM A-36), controlled (low) carbon steels will frame the industrial building of the future. These steels provide greater flexibility in stress range and safety factors.

Discussing construction methods, Miehls said: "In the primarily one-story industrial building . . . structural steel frame elements . . . will continue to be simple spans of beams or trusses."

He then commented on the recent use of plastic design in some buildings with unusual loading demands. (Plastic design, according to Miehls, employs a plastic or flexible hinge at support points. It then requires a moment connection at the shear hinge to restore the frame's structural adequacy.) "The plastic theory of design may have limited applications," Miehls said.

He warned that plant men may be courting trouble if they use the plastic principle indiscriminantly in building frames. He advised particular caution where a building is subject to changing loads and changing load locations.

Concluding his remarks on plastic design, Miehls said: "For special rigid frames . . . where loads can be predicted, the theory has merit. For the first time we have a basis of design which recognizes the continued load-carrying ability of structural steel at yield point with an increase in strain without a change in stress."

IN ALUMINUM

The speaker was James M. Vann, Jr., manager of commercial and industrial building sales, Aluminum Company of America, Pittsburgh.

Mr. Vann predicted that the aluminum industry would reap a fair share of the booming industrial building business—which is expected to increase 170% by 1969 to a total of $5.4-billion.

The Alcoa manager credited his product with erasing "the architectural sterility long associated with industrial building."

He pointed out the square-foot economy of aluminum sandwich wall (less than $1.60 with color). A sandwich panel consists of an interior aluminum sheet, 1 to 1½ inches of insulation, and an exterior aluminum sheet. The panel is applied in the field. It has, according to Vann, the insulation value of an 8-in. masonry wall.

Also gaining in popularity are corrugated siding and prefabricated panels. The latter, reported Vann offer the advantages of hidden fasteners and more visible flat area. They offer fast construction at about 75 cents a square foot for non-insulated panel and $1.65 a square foot for insulated.

A recent development cited by Vann is a line of pre-engineered aluminum buildings carrying a 20-year warranty. Available in a wide range of exterior colors, these buildings are suited for manufacturing, warehouse, and office applications.

Aluminum roofing also received

By LAWRENCE F. MIHLON
Associate Editor, FACTORY

STEEL

plaudits. It is noted, said Vann, for long life, clean, bright appearance, and heat-reflective properties. Colored aluminum roof coatings (fibrated and straight pigment) have recently been made available, Vann reported. These cost about 5 cents a square foot.

In closing, Vann credited new methods of joining aluminum, such as welding, adhesives, sealants, and blind rivets, for dispelling old superstitions about the bright metal's industrial applications.

IN CONCRETE

The speaker was James D. Piper, vice president, Portland Cement Association, Chicago.

Mr. Piper stirred his audience with a prediction that the revolutionary uses of precast, prestressed, and shell concrete will force plant men to revise their thinking about architecture and engineering.

"Not only are there greater possibilities for beauty and originality with concrete today, but from a practical standpoint it is proving even more versatile and economical," the cement spokesman remarked.

Mr. Piper said that the use of shell concrete has "freed the architect from many straight-line restrictions and thus has created the most conspicuous change in design in the past two decades."

The ability of engineers to induce curved, three-dimensional surfaces into shell concrete is providing exceptional strength in roof design, Piper reported. He said that folded-plate three-dimensional concrete, averaging 3 to 4 inches in thickness, can be practical for spans of several hundred feet.

A most spectacular example of shell construction is the Exposition Palace near Paris, France. With one curving triangle of concrete, the building covers a 10-acre area—without supporting columns. The industrial applications of this principle appear certain.

Prestressed concrete was referred to by Piper as "concrete with muscle." The name derives from the high-strength, flexible steel cables stretched through the concrete slab for high-tensile strength.

Plant men were told: "Prestressing now makes it economically possible to use concrete for longer spans and for shallower members for roofs and floors."

This type of concrete was reported by Piper to be especially effective in resisting cracks caused by corrosive fumes.

The third major development discussed by Piper was precast concrete. Its chief economic advantages are: re-use of forms for large numbers of identical units, a great reduction in carpentry and formwork, and ease of construction.

Precast wall and floor units are fashioned in three ways: tilt-up, lift slab, and curtain panels.

One of concrete's greatest virtues, as reported by Piper, is an aesthetic one. Because the material is plastic in its initial forming stages, it can be given a great variety of surface textures and patterns.

Square, curved, or prismatic patterns are a few of the variations readily attainable in concrete façading. The visual impact of a concrete wall is limited only by an architect or plant man's imagination.

But this flexibility of texture is more than just aesthetically exciting. To prove the point, Piper related this story:

Recently a contractor was asked for a rough, but attractive concrete wall that would in some way discourage children from making marks on it. The solution he hit upon was an ingenious one:

The walls were to be erected by tilt-up. To obtain the irregular surface desired, a layer of crushed rock and gravel was placed in the bottom of the tilt-up forms and covered with a plastic membrane. When the concrete was placed over this, the result was a glossy surface, indented with numerous "child discouraging" dimples.

IN PLASTICS

The speaker was William Demarest, director of plastics in building, Manufacturing Chemists' Association, Washington.

Mr. Demarest advised that among the properties that make plastics more desirable than other building materials is their general resistance to corrosion. He cited industrial piping as an example.

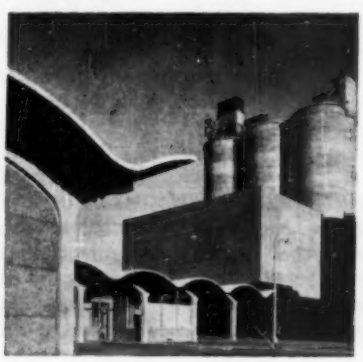
Other properties singled out by Demarest were: good electrical insulation, low thermal conductivity, and high strength-to-weight ratio.

Looking ahead, Demarest reported a new plastic film will soon be released that can be used as a temporary enclosure for winter construction. Another film (polyvinyl fluoride) will offer a life span of from 15 to 20 years and low cost as a refinishing medium.

Also expected to hit the market soon, Demarest said, are translucent sandwich-panel cores and jointless tile coating for wall surfaces.

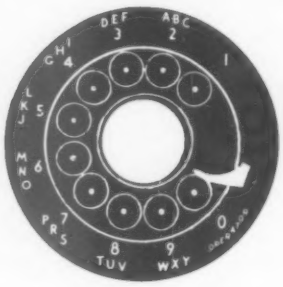
ALUMINUM

CONCRETE



PLASTICS

UPDATING PLANT TELEPHONES



In-plant phone systems are benefiting from better equipment, additional services, and changing policies. Here's what's new, and what you can do to boost telephone efficiency.

How are telephones rated in your plant? As overhead expenses to be kept to a minimum? As emergency intercom devices to be used when you don't feel like walking? As sources of annoyance that keep key men deskbound on busy days? Or as tools purchased, used, updated, and required to pay off in the same manner as any other tools or plant facilities?

The way your plant rates phones may have a direct bearing on your operating efficiency. If there are enough of the right kind of telephones in the right places, they increase the effectiveness of every employee and facility in the plant. Used otherwise, they can be expensive annoyances that get in the way of the men who should be using them. Phones are tools, and plants should evaluate them as such.

Over the last few years—and especially during the last year—important changes have been taking place in the industrial telephone field. The most obvious is the shift from a seller's to a buyer's market. Consider what's happened within the Bell System. During the last several months some 7000 sales personnel of Bell's member companies have undergone special training courses on the specific communication problems of different kinds of factories (and businesses). Bell has also appointed individual account managers for some 700 of the country's largest companies. These supervisors will coordinate phone company and customer liaison for all plants and offices of the accounts they handle.

Thus, it's quite likely that an idea to improve telephone service in your plant may be passed on to Bell representatives serving your other plants, perhaps before your own organization does anything about it. General Telephone Company, largest of the independents, has put a similar plan into effect.

This trend toward *selling* telephone service instead of *taking orders* is admittedly a result of growing pressure from manufacturers of private telephone and intercom systems. Privately owned in-plant systems have been growing in number and importance. Several manufacturers of European-made telephone systems have begun aggressively selling equipment in the U.S. Also, recent court decisions and FCC rulings have shrunk Bell's primacy in some fields. (For instance, private industry may now obtain licensing for point-to-point microwave communication; Bell System member companies can no longer install public address paging equipment connected to plant phone systems.) And an increasing number of plants are using private phone systems for plant-to-plant communication, leasing only lines from Bell or Western Union.

All this adds up to the fact that from now on you'll be getting greater help and better service (plus more selling effort) from telephone equipment and service suppliers, both public and private.

NO JOB FOR A "NO" MAN

But none of these and other trends that promise better phone service can help you if your plant isn't set up to take advantage of them.

You can't expect an outsider, especially a new one, to understand your own communication needs as well as an experienced plant supervisor working with the problems daily. The key to the success or failure of your phone system often lies with the man chosen to handle the planning of your system and the negotiations with telephone service and equipment suppliers. The most difficult plant to help, according to tele-

HOW TO SURVEY PLANT TELEPHONE NEEDS

The biggest cause of inadequate telephone service is a lack of information about the communication needs of each employee. The checklist below is intended to help you prepare a survey questionnaire.

BASIC INFORMATION

1. Name, title, department, location, and shift of each employee who uses a phone.
2. Estimated percentage breakdown of incoming and outgoing calls: inter-plant, local, and long distance.
3. Names of in-plant personnel called frequently.
4. Average daily number of calls.
5. Daily, weekly, or monthly pattern of LD calls.
6. Percentage breakdown of frequent LD calls to and from specific branch plants or cities.
7. Is there evidence of continual heavy telegram or airmail expense to specific plants or cities?
8. Is there a recognizable pattern of unusually short or lengthy calls?
9. Are telephone needs greater during certain periods of the week, month, or year?
10. Any complaints that this phone is often busy?
11. Is there a secretary or someone else available to answer the phone?
12. Must this employee be accessible by phone when away from his desk, work area, or the plant?
13. Must this employee be able to reach other personnel quickly when they are away from a telephone?

SPECIFIC EQUIPMENT NEEDS

1. Conference call facility.
2. Pushbutton dialing to save time.
3. Executive priority to alert busy phones.
4. Emergency priority to interrupt busy phones.
5. Privacy switch to cut out extension phones.
6. "Message waiting" light.
7. Additional phone or line to call others for information without interrupting original call.
8. Access to recorded plant news or information.
9. Amplification to offset impaired hearing or noise.
10. Hands-free equipment for writing or consulting blueprints during conversation.
11. Signal lights or extra-loud phone bells.

GENERAL QUESTIONS

1. Where necessary, is telephone equipment protected against explosion, weather, and unauthorized use?
2. Are there adequate phone services for visitors?
3. Are jacks available for plug-in phones in areas where layout changes—test floors, warehouses, and the like?
4. Are there coin phones in various plant areas? Or in out-of-plant areas where a caller may be stranded?
5. What provisions have you made for the future phone needs of each area?
6. Have you provided for both present and future uses of communications cables—intercom sets, production data transmission, telemetering, remote control, industrial TV, time clocks, alarm circuits, code calling?

phone engineers, is the plant that puts a top staff "watchdog" on the job instead of a supervisor who encourages improvements in methods and equipment. The "watchdog" is far too often the kind who sees every phone as an added expense, telephoning as time wasted from production, and communications experts as order-hungry salesmen. He probably makes no provision in the budget for adding new time-saving improvements as they become available. If your plant has a "no" man supervising communications equipment, you may have to circumvent or convert him before you can really improve your in-plant communications system.

Except for very large plants, communications supervision is normally a part-time responsibility. None of the telephone experts FACTORY interviewed felt that combining communications supervision with any one particular job function was the touchstone to success. The important thing is that the supervisor has a thorough understanding of all plant communication problems—especially those of plant operating personnel. (Top executive, sales, and financial staffs are more likely to understand their communication problems better and have them under control than the manufacturing group.)

How to get around or convert the "no" man? Here are a few of the suggestions offered: Set up a communications committee with representation from all major functions at the plant. Or get decisions on telephone facilities put on a departmental basis, using plant-wide supervision only over switchboard facilities. Or install a separate in-plant phone or intercom system. Or best of all: Assume your "no" man really wants help. Make sure he has all the facts, support, and help you can give him.

The items in the checklist given above are a good starting point to get the facts. You'll probably want to supplement them with questions geared to your own plant set-up.

Turn the page

ONE OR TWO PHONE SYSTEMS?

No discussion of phone systems would be complete without at least a brief analysis of the merits of private vs. public telephone systems for in-plant communications. (We are dealing here only with dial-type, private circuit phone systems. All-master or master-slave intercom phones or sets are not included.) Virtually no public systems allow the user to install his own equipment on their lines. Public phone companies sell service, not equipment.

Bell System engineers point out that this means a customer's phone system is continually tailored to his changing needs, that worries over maintenance, depreciation, obsolescence, high initial investment, and spare parts inventories are completely eliminated. When business shrinks, unnecessary phones or equipment don't have to be paid for. When new switchboard or phone developments come along, the customer doesn't have to scrap or resell equipment before the system can be brought up to date. Telephone service is expensed as it is used, based on business.

However, manufacturers of private automatic phone systems point out that there is often a real need for a separate inside phone system—that when a man's phone is tied up on an internal call, an outside customer calling has to wait or call back later. "You can't get your money's worth out of your public phone facilities if your switchboard is so clogged with inter-plant calls that people walk instead of phoning." When phone-usage pattern reaches a certain point, renting more extensions may add to plant overhead without increasing efficiency.

According to telephone experts, there are at least two circumstances where it makes sense to investigate a private phone system. The first is when long-range business level and growth rate are predictable. (Then the proper type of switchboard equipment and cabling can be installed right at the start.) The second is when outside calls to or from long distance or high "message unit" parties are frequently put on "hold" while inside calls for information are made.

Private systems offer wider choices of equipment and some switchboard features unavailable in public phone systems. And there is no monthly phone bill or tax. The owner is free to install any type of equipment whenever he wants to. In fact, telephone equipment built by different manufacturers can often be added to an existing system enabling you to take advantage of price or performance benefits. Further, many distributors offer lease-buy options.

Payoff time for a well-designed second phone system is often only two or three years—sometimes less.

REPRINTS AVAILABLE...

of this
FACTORY
exclusive report

Write Reader Service Department
FACTORY, 330 West 42nd St., New York 36

35¢ for single copies
25¢ for 2-24 copies
20¢ for 25-99 copies
Ask for quotation on 100 or more copies

SOLVING SPECIFIC PROBLEMS

There is no shortage of solutions to plant communications problems. The big hurdle, say telephone engineers, is to make users aware of the advantages of new equipment. "In too many plants, any phone other than a plain black desk set tends to become a status symbol." The result is that management balks at equipping personnel, such as production control or shipping supervisors, with the newer, more versatile phones they need because the company officers haven't yet received them.

Some observers have pointed out that much of the blame for this situation falls on telephone suppliers' promotion methods. "You never see an ad or publicity photo showing a new pushbutton phone console on the desk of a maintenance superintendent—but he probably needs it much more than the comptroller!"

Here's a rundown of some typical communication problems and the equipment or methods available to solve them:

Overloaded switchboard operators

The two solutions to this problem up to now have been to install an automatic private phone system or to relieve the operator of work on outside calls by converting the switchboard for "Dial-9" automatic operation. Recently, many plants have gone a step further with direct inward dialing (D-I-D). In effect, the plant becomes a separate branch exchange and any phone can be reached directly from the outside without going through the switchboard. Similarly, outgoing calls bypass the switchboard.

Dow Chemical made the pioneer industrial D-I-D installation almost two years ago at its Midland, Mich., plant. Dow management told FACTORY, "We now have much better communications with our customers, sales offices, and plants. Our service and telephone courtesy have been immeasurably improved. We make more long distance calls now, but at the end of each month, the department manager gets a listing of LD calls, who made them, their cost, and their destination. We actually have better control over LD usage now than we did through the switchboard."

Wasted time of key men

Both the Bell System and many private system manufacturers have developed telephones combining pushbutton intercom convenience with regular dialing. On some units it's not necessary to lift the receiver. To reach frequently called phones, you simply

WHEN TIME IS PRECIOUS, this private telephone with a "priority" button permits you to signal busy lines to "please finish soon." With its pushbutton-dial combination you can place calls without lifting the receiver. *Tele-Norm Corp.*

YOU PUSH THE BUTTON instead of dialing frequently called in-plant numbers with this new "call director." The time-saving console combines intercom facility and standard telephone. *Bell Telephone System.*

HANDS-FREE PHONING can save time and steps all over the plant. Built-in amplifier-speaker-microphone (under phone) permits group conversation 25 feet away. *Stromberg-Carlson.*

NO ONE IS UNAVAILABLE when new pocket paging extends your system. "Beep" alerts the wearer that someone is trying to reach him. *Stromberg-Carlson.*

PHONES IN NOISY AREAS can be effectively isolated in acoustic booths or can utilize throat mikes like the "Laryngaphone," which doesn't pick up any shop noise. *Ericsson Co.*

NO PLACE IS UNSUITABLE if the phone is properly protected. Housings to protect phones from any hazard are available. *Automatic Electric Co.*

push the appropriate button. When the party answers, you get a signal to lift your receiver.

The "executive priority" feature is attracting many buyers of private phone systems. When an executive phone dials a busy line, both the busy parties hear a subtle warning tone. Some systems enable the priority phone to cut in on the conversation after a second warning is given.

While the Bell System does not provide equipment that compromises telephone secrecy, they do have a new businesslike method of handling emergency calls —a group alerting and dispatching system to tie together plant volunteer emergency or fire protection crews. The dispatcher simply picks up his "red" phone, dials one digit, which alerts up to seven different crews, and announces the emergency message, which is simultaneously recorded. At the same time, a distinctive alerting ring is heard on all the called phones. If any phone is busy, the alert will "camp on" until the line is clear and then ring. As soon as the receiver on each called phone is lifted, the recorded message is heard.

Bell has a "message waiting" system now being installed in hotels which could also be used in plants. When there is no answer at a called number, the operator takes the message and flips a switch that turns on a small light at the unanswered phone. When the called party returns, he simply calls the operator to get the message.

"First free line" or "group hunting" calling is a time-saver available from several private phone system manufacturers. When the normal call is to a department, rather than to a specific phone within it (i.e., accounting, filing, inventory control departments), incoming calls are transferred from a busy line to the first free phone in the department.

The "conference call" feature has been available for many years. Yet telephone engineers say users often fail to take advantage of it even where it's installed. Some private phone systems now provide an "add-on" feature, enabling conference calls to be expanded midway by dialing in more parties.

But time-savers aren't confined to brand-new equipment. One of the most thoughtful ideas is to see that an extra wall phone is placed conveniently in every room or office where key men confer frequently. No one has to leave the office or reach across the conference desk to answer the phone.

Reaching people on the move

There's a whole basketful of solutions to this problem, most of them well tested in industrial service. Telephone paging is available from all the private phone manufacturers FACTORY contacted. Equipment is simple. A tie between the switchboard and the plant paging system makes it possible for any phone (or selected phones) to cut in on the plant paging system simply by dialing the right number.

Plant personnel can be reached more unobtrusively with radio paging or mobile phone equipment. The new pocket-paging receivers are alerted by a signal normally controlled by the switchboard operator. Bell is offering this service for about $20 monthly on a city-wide basis in some areas now, using equipment similar to Stromberg-Carlson's Pagemaster. When the called party hears the "beep," he goes to the nearest phone and calls either the operator or a prearranged number. Sets like Motorola's "Radio Pager" operate similarly, but include a facility for reception of a voice message.

Plant phone users no longer need to be desk-bound. Bell and all private phone systems offer phones with built-in speakers and microphones enabling you to converse from across the room after turning on the "answer" switch. Automatic Electric's private phone system enables the caller to turn on both microphone and paging speaker at the called party's work area by simply dialing his number. Thus, you can get in instant touch with stock or file room personnel and they can answer while searching remote shelves.

Making phones do double duty

It's surprising how few plants utilize the full capabilities of their phone systems. Almost any private system can be connected to remote dictation recorders. Tele-Norm offers a new watchman control interconnected with the switchboard. The watchman calls in from designated phones, using a prearranged (and easily changed) code number. If he fails to dial on schedule, an alarm sounds and the last check-in point is displayed on an annunciator.

"Dial-the-news" is another way to make a phone system work for you. One General Electric plant uses a recorder to play back fresh news or anything of interest to plant managers who dial in. (See Case Book in next month's FACTORY.)

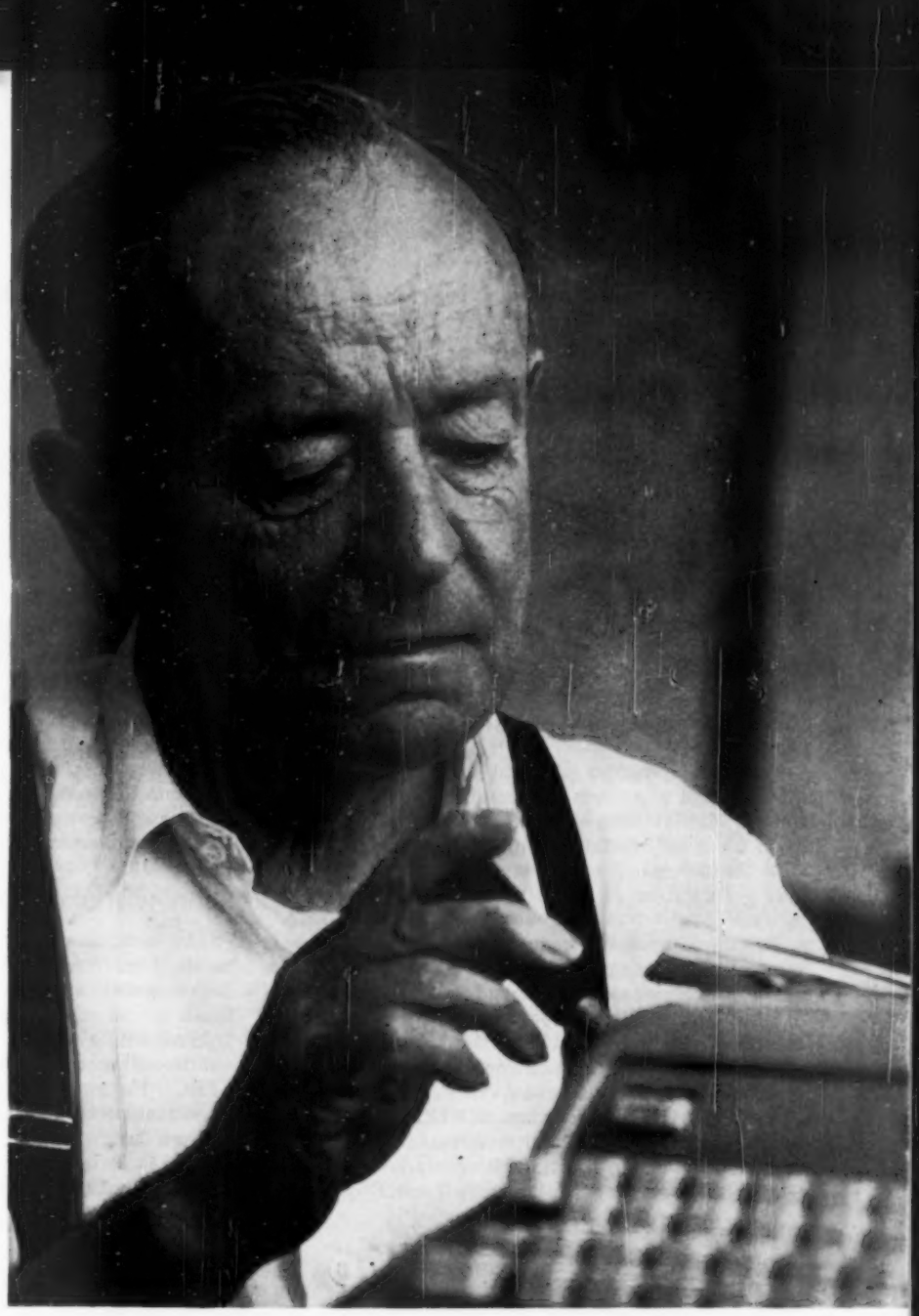
TOMORROW—THE SWITCHBOARD THINKS

The trend is unquestionably toward making the switchboard do more than route phone calls. Ericsson's new LME switchboard (for plants with as few as 30 lines) shows what future trends may be like. For example, if the party you call is busy you just dial a code number. This instructs the switchboard memory to complete the call when both phones are free. Meanwhile, you can go back to work and wait for a signal. If you leave your office and want calls rerouted, you simply dial a code, followed by the number of the shop or office location you are visiting, or of a secretary, or of a recorder which will explain your absence and record any message. Bell System's experimental "track-down" phone exchange and transistorized phones at Morris, Ill., works much the same way, with super-fast dialing and instantaneous all-electronic switching.

A plant telephone system won't work as an efficient tool by itself. Equipment and methods change. To keep on top of your communications needs, it's necessary to make periodic surveys. Otherwise, it's quite possible you'll end up installing the right bits and pieces of equipment in the wrong places.

"One winter with TV was enough. I wanted in on life again. Money was no problem. I was not lonely. Yet something was missing after I retired two summers ago."

—Frank Donnelly, 66, retiree, an assembly worker for nearly 45 years.



Old timers get a new lease on life

Despite a retirement program as good as any in industry, Royal McBee Corporation heard gripes from many old timers like Frank Donnelly, above. Money wasn't everything. They wanted more out of their twilight years than a comfortable rocker and a pension check. They wanted to produce—to get back into harness.

Royal McBee's Hartford, Conn., plant has given them the means to do just that. The company has set up a typewriter repair business and handed it over to interested retirees. Though keeping completely independent of the new company, Royal McBee is at present providing logistical support, training facilities, advisory personnel, and space leases at a token fee. But only training is to be a permanent service.

As of this writing, Senior Typewriter Repair Company is in the process of incorporation. A stock arrangement is being worked out so retirees will receive shares on the basis of the number of hours each man spends on the job.

Turn the page

Pension plans alone are not enough.
Senior citizens also need their self-respect.
A new job gives them a reason for living.

Senior Typewriter Repair Company (STRC) will serve to ease the retirees over the transition period from an active life to the slower twilight years. It is giving them a place in the sun as productive and happy people.

Royal McBee has for some time sponsored a golden age club for retirees to meet socially and discuss their problems. It was here that Jim Murdock, training director, conferred with scores of old timers, and got the idea that sparked the birth of the new company.

After guiding the fledgling firm onto its feet, Jim appointed Ron Foster, a 25-year-old training specialist as liaison man between STRC and Royal McBee. It's Ron's job to work with—but not direct—the retiree company.

When the program was first announced there was quite a bit of apprehension, according to Foster. "Wild rumors such as 'management is calling in the retirees to do our jobs,' spread around the shop. By consulting with the union and explaining our objectives, we not only got approval of union members but their support as well."

Of course, like any business, a primary problem is sales of the company's services. To get started, the new company offered to clean and repair the typewriters of any Royal McBee employee at a price lower than they could get elsewhere. Says Foster, "The response was terrific. It gave the men confidence that they could make a go of their new enterprise."

That was last year. Today, STRC is farming out a substantial amount of work that its regular repair department is too busy to handle. However, Foster stresses, STRC isn't soliciting work strictly from Royal. "We hope in the near future to contract work from a number of outside companies—some that may be in direct competition to Royal McBee."

Employment in the company is limited only by the amount of work contracted. Expansion takes place as business picks up. "This is possible because the sole objective of the organization, unlike other business, is not just ever-increasing profits."

After retirement, working hours and time spent on the job are left almost entirely to the discretion of the individual retirees. Most of the men spend an average of 15 hours a week in the shop. Under the present agreement the men can draw a dollar an hour for their work plus a transportation allowance. However, in most cases, that money is kept on the books or put back into the company.

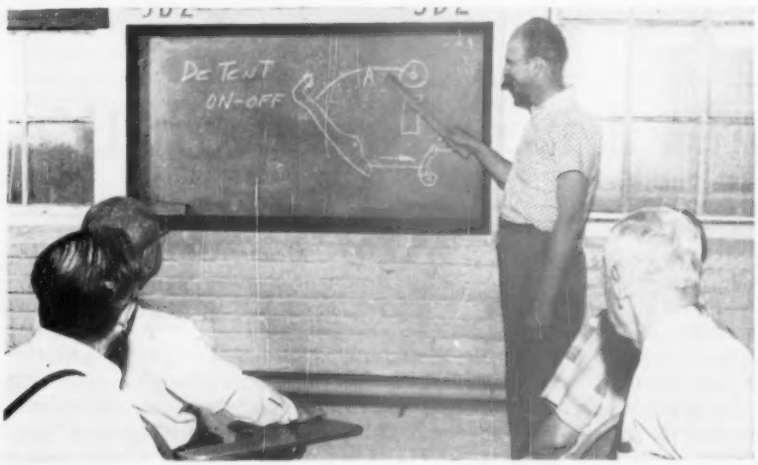
Most of the men have to gauge their earnings to conform with social security and pension requirements.

Retirees make their own decisions

The basic administration of the company is in the hands of the owners—they choose their own officers and discuss policy decisions among themselves. Royal officials act strictly in an advisory capacity.

Fred Ott, 67 (right, top photo), who retired as a utilities adjuster in 1959, was elected first president of STRC. He may consult with Murdock or Foster on important problems, but decision-making is strictly in his own hands.

This is in line with Royal's objective in setting up the new company—to help it stand on its own two feet



TRAINING: Royal gives classroom and bench instruction.

ON THE JOB: Oldsters tackle

YOUTH SERVES AGE: Ron Foster (left) and Jim Murdock (center) confer with Fred Ott, head of STRC.

and act independently. The long-range training program will continue indefinitely as will some advisory help. Otherwise, self-reliance will be stressed. Future plans include STRC's moving out of the Royal plant and into its own shop.

The supplies problem is being handled, at least temporarily, by Royal McBee. STRC can order items such as cartons from the general supply with an order form, as if it were a department in the plant.

With the help of Royal McBee, a two-phase training program is in the process of being set up, with part one already in operation.

Part 1. Immediate retraining: Paul Pedersen (left photo, below), a repair specialist, works three hours a day with the old timers. Part of the time is spent in classroom lectures. The rest is spent in instruction at the work bench. Says Paul, "The expected difficulty in teaching old dogs new tricks just hasn't come up. The oldsters are as eager to learn as any 18-year-old high school graduate on his first job."

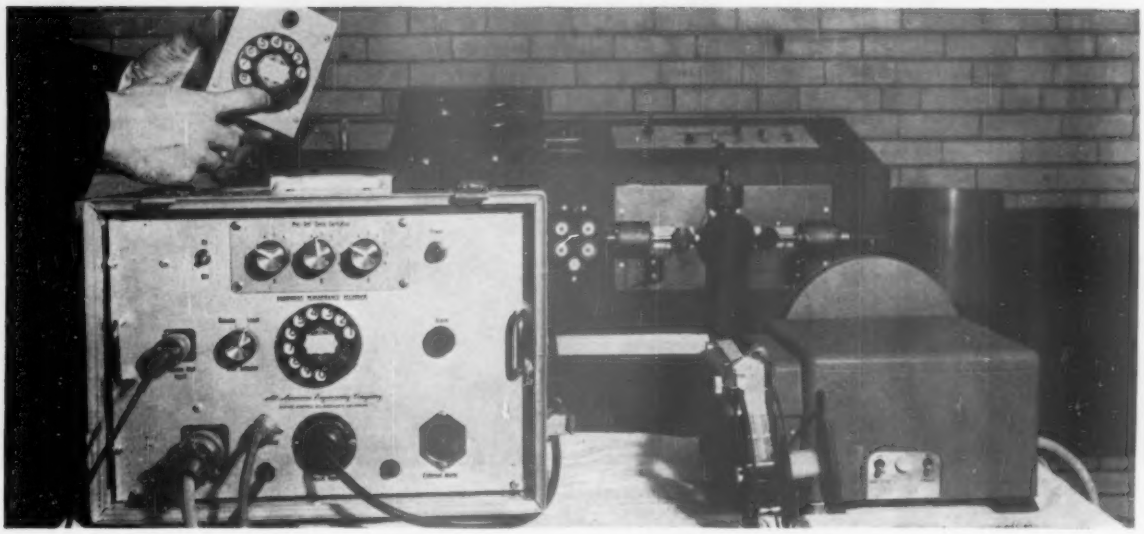
Part 2. Training potential workers: Royal McBee's plan for the near future will affect the last year of a retiree's employment. This will be partly spent training for a new career. Interested workers can attend on-duty classes qualifying them for jobs with STRC. About 70 employees retire from the Hartford plant during an average year.

One problem not so easily solved in a business with older people is the occasional personality conflict. It's hard for 65-plus workers to alter their temperament. This fact is carefully weighed when considering a retiree's application to join the company.

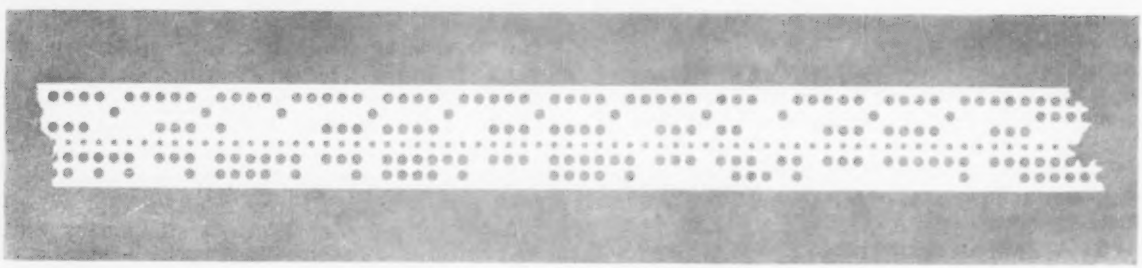
ypewriter repair order.

PAPERWORK: Retirees handle their own bookkeeping details.

DIAL YOUR DOWNTIME HISTORY . . .



AUTOMATICALLY ON PUNCHED TAPE . . .



FOR EXACT REPORT OF CAUSES

Are you underestimating downtime of your production machines? If so, you're inviting scheduling problems. Or perhaps you're overestimating? Then you're not getting the most out of your equipment. What you need is an effective downtime analysis to pinpoint the chief causes, and thus increase your equipment utility. Only way to do this is to get specific data on *each* downtime. Here's an instrument that gets such facts automatically —the equipment performance recorder (All-American Engineering Company, Wilmington, Del.).

This recorder is a data transmission and storage system that registers on punched tape the exact history of downtime of a production line or process. It consists of a dial-operated encoding unit (top left) and motorized paper punch (top right). From the time a machine stops until production is resumed, this system clocks off lost minutes. The human element enters only once—to dial in the cause of stoppage.

Now let's see how the recorder works. If you have a machine with a history of frequent downtime, connect the recorder to it. This can be done electrically, thermally, mechanically, or by any means indicating a change of operating condition. (Installation need not be permanent; it can be moved from one machine to another.) Stoppage of the machine actuates the recorder's timer, which keeps clocking downtime until production is resumed. When the cause of stoppage has been remedied and the operation restored, the recorder sounds an alarm. This reminds the operator or maintenance man to dial the history of that downtime.

First, he must translate the trouble—its cause and location—into a four-digit code number before dialing. (Code is custom-made to suit each application.) Dial can be remotely located up to several hundred feet from the recorder. The history, together with total downtime clocked by the timer, comes out of the paper punch as 5-channel tape. The tape can then be processed by a variety of data processing equipment. Or it can be processed by commercial services that will give you complete downtime reports the very next morning.

Price of equipment depends on nature of installation, is said to be roughly $2500.

A

FACTORY

ENGINEERING AND TECHNOLOGY REPORT

NON-DESTRUCTIVE TESTING

NO. 10

NON-DESTRUCTIVE TESTING

NON-DESTRUCTIVE

It's no longer a laboratory curiosity. Non-destructive testing is a valuable tool for improving manufacturing, maintenance, and—especially—quality control. Even product design and manufacturing engineering benefit from wise use of new testing methods that don't damage or impair serviceability of items tested.

New demands for reliability are placing increased importance on 100% checking of missile, nuclear, and electronic components. Destructive testing on only a sample of output is no longer acceptable. Only through NDT (non-destructive testing) can random discontinuities be found, preventing operational failure in critical equipment.

In some cases, NDT can even monitor the skills of craftsmen—welders, foundrymen, workers in a tire factory—by impartial and reliable checking. But, in most cases, non-destructive testing serves better as a management tool than as a policeman.

Today's faster speeds, in transportation as well as production lines, are making greater demands upon machines. Stresses applied often vary as the cube of the increased velocity. At the same time, engineers are under pressure to reduce equipment weight. As a result, safety factors are gradually reduced, excess material is designed out. The assumption: The material to be used will be of guaranteed uniformity and quality.

This increasing importance of NDT shows up in many places within industry, as well as within professional societies. Companies like A. O. Smith, Avco, and Lockheed have their own NDT departments. So have organizations like the Los Alamos and Argonne labs. The absorption of old timers in the field (Magnaflux and Sperry Products) by General Mills, Inc., and Howe Sound Company vouches for the economic future of NDT.

Specifically, here's what NDT can do:

Reduce materials and production costs by eliminating defective and off-standard material during fabrication or processing. Certification of material shipments by NDT at the receiving platform keeps raw material inventory under close control.

Prevent wasted labor and machine time by eliminating the investment of effort and equipment time in defective material that will only be thrown out later in the manufacturing cycle. Detecting defective machine parts before they fail on production equipment sharply reduces emergency downtime. Through NDT, maintenance can plan shutdowns, replacing only those parts needing it.

Assure adequate product quality by finding buried defects before they get outside the plant door and cause service failures in customers' plants.

Other advantages, often intangible, can be claimed: promotional and advertising benefits and improved qualifications for critical government work. More than one manufacturer has built customer acceptance and company growth on product reliability and serviceability. Increasingly, NDT has been the tool.

But the principal advantage of non-destructive testing lies in the plant. Closely designed products can be produced confidently from material that meets specifications. During fabrication, parts can be checked for possible defects after each suspect operation. (Heat-treated parts can be checked for either cracks or decarburization, poor welds uncovered before machining, and grinding checks caught before finishing.) Maintenance can foretell machine failures; quality control can maintain 100% surveillance.

Many plants have found it pays to invest 10% of the cost of subsequent machining and finishing operations in non-destructive tests preceding each critical production process. The alternative: Spend 20 to 50% of over-all production costs on rework or finishing parts that are already defective beyond repair. Discovering defects at final inspection rather than when they occur does little to improve the profit picture.

What does all this cost? Anywhere from one-tenth of a cent to $100 per piece. Final

This Engineering and Technology Report is based on material presented at a Non-Destructive Testing Seminar sponsored by Westinghouse Electric Corporation.

TESTING

costs depend on these four main factors: What is inspected? In what quantity? What is it inspected for? By what method? It is the combination of these factors in your own plant that will determine the final cost of NDT.

But the starting point is initial cost of the non-destructive method. In simple liquid penetrant kits, this can be as low as $200 for a method usable in shop or field inspection. X-ray test facilities will have a price up in the thousands. Expensive test systems, such as a multi-million-volt television fluoroscopy or an ultrasonic immersion unit with automatic bridge scanning, can range from $50,000 to $300,000. Yet, despite these costs, such systems find practical justification in some plants.

Large capital costs of these systems may be related to supplementary facilities for handling large test parts. And in most cases the added investment may be worth it. Even the least expensive test equipment can be expensive to operate without proper supplementary material handling for high production inspection. However, you can determine your own break point on auxiliary equipment.

Don't overlook another factor: the ratio of personnel cost to equipment cost. Expensive equipment in the hands of incompetent personnel brings no return—perhaps even a sharp loss. Training the skilled operator is another investment to consider.

If these costs make your own NDT prohibitive, you should consider the independent and cooperative services available (if you can send parts out to be tested).

Getting started with NDT means observing a few cautions. Go into it with your eyes wide open. Expect some of these problems to crop up:

Where does the organization fit? Reporting to the quality control manager seems to work best. But communications should be open between the NDT supervisor and other interested departments: production, engineering, customer quality control, and vendor quality control. In some heavy fabricating plants, like A. O. Smith, the responsibility may be heavy enough to create a separate department.

What kind of people to use? Look for someone with these qualifications:

Knowledge of fabrication processes and product requirements.
Knowledge of conventional types of welding.
Familiarity with related engineering and material standards.
Ability to communicate results—both in oral and written form.
Ability to work harmoniously with shop personnel, customers, and others.
Curiosity that makes him look for more than the test discloses.
Adequate vision for the job.

How can personnel be trained adequately? The most perplexing problem is the training—and retraining—of topnotch personnel. These courses may help:

Magnaflux Corporation	A one-week course on basic concepts
Ohio State University	A very comprehensive two-week course
Society for Non-Destructive Testing	Courses sponsored by local chapters
Westinghouse Electric Corporation, Materials Engineering Department	Courses in ultrasonics and radiography
Sperry Products, Inc., and Curtiss-Wright Corporation	Ultrasonic courses by special arrangement
SNT Journal, Evanston, Ill.	Announcements of courses at universities

How do you match your testing problem with the right NDT method? The table on the next two pages will give you the basic details. You might also consult the 1900-page *Nondestructive Testing Handbook* by Robert McMaster, Ronald Press, New York.

Turn the page

NON-DESTRUCTIVE TESTING

NON-DESTRUCTIVE TESTING

NON-DESTRUCTIVE TESTING

NON-DESTRUCTIVE TESTING

NON-DESTRUCTIVE TESTING

NON-DESTRUCTIVE TESTING

NON-DESTRUCTIVE TESTING

NON-DESTRUCTIVE TESTING

NON-DESTRUCTIVE TESTING

NON-DESTRUCTIVE TESTING

NON-DESTRUCTIVE TESTING

NON-DESTRUCTIVE TESTING

NON-DESTRUCTIVE TESTING

NON-DESTRUCTIVE TESTING

NON-DESTRUCTIVE TESTING

NON-DESTRUCTIVE TESTING

NON-DESTRUCTIVE TESTING

NON-DESTRUCTIVE TESTING

NON-DESTRUCTIVE TESTING

NON-DESTRUCTIVE TESTING

NON-DESTRUCTIVE TESTING

NON-DESTRUCTIVE TESTING

NON-DESTRUCTIVE TESTING

NON-DESTRUCTIVE TESTING

NON-DESTRUCTIVE TESTING

NON-DESTRUCTIVE TESTING

NON-DESTRUCTIVE TESTING

Where, when and how you can use

This method . . .	with this principle of operation . . .	can be used for . . .	but has these limitations . . .
Ultrasonic	Vibrations above 200,000 cps. are introduced into sample. Waves are reflected or scattered by discontinuities.	Quality control. Material inspection. Preventive maintenance.	Sensitivity is reduced by rough-surfaced parts. Odd-shaped pieces are hard to analyze. Requires skilled operator.
	Resonance systems: Frequency varied. When natural frequency of material is hit, amplitude of vibration increases.	Thickness measurement. Discovering laminar defects and corrosion wall-thinning.	Works best on parts with parallel sides.
	Pulse-Echo: Frequency constant for a very short pulse. The bounced-back (echo) pulse is accurately timed, indicating depth.	Locating casting inclusions, internal ruptures, poor welds.	Requires well-trained and experienced operator to evaluate signals.
Particle Testing	Concentration of special particles visually locate surface defects.	Quality control. Material inspection. Equipment inspection.	Won't uncover buried defects.
	Magnetic particles are attracted to breaks in magnetic lines of force.	Locating fabricating discontinuities, stress cracks.	Not applicable to non-magnetic metals or material.
	Liquid penetrant in cracks, on otherwise clean surface, attracts particles of applied dye.	Surface inspection of parts sensitive to magnetization.	Will not find subsurface defects.
	Filtered particles from liquid suspension are deposited at defects in porous material.	Inspecting porous materials.	Won't work on solids. Little-known technique.
	Electrified particles blown through rubber nozzle collect at negatively charged defect.	Inspecting non-conducting solid materials.	No acceptance standards for this technique.
Eddy Current	A-C coil induces current in two samples. Analysis of currents indicates any physical differences.	Automated production-line testing. Identifying wrong material.	Cannot give absolute measurement—only qualitative comparison.
Remote Surface	Examination of inaccessible surfaces with special devices, i.e., borescopes, replica probes, panoramic cameras, fiber optics.	Visual examination of hidden surfaces.	Will detect only defects visible to the eye. Cannot find buried defects.
Thermal	When applied to heated surfaces, special materials change appearance. Non-conducting areas (poor bonding) are outlined.	Checking brazed or bonded areas.	Requires precise control of temperature and heat input. Difficult to inspect resin bonds.
Radiation	**Penetrating rays** (x-ray or gamma) cast shadows on the other side of "solid" objects. Voids permit more rays to penetrate. **Film radiography** records shadow on photographic film. **Fluoroscopy** records shadow on fluorescent screen.	Manufacturing. Quality control. Preventive maintenance. Weld inspection. Finding foreign objects in packaged goods. Geometric details of enclosed surfaces. Thickness gauging.	Economic limit to depth penetration. Hazardous operation. Not sensitive to defects less than 2% thickness of total metal. Complex shapes are difficult to analyze.

non-destructive testing methods

. . . and these advantages:	It will test . . .	for these defects . . .	and is available from:
Locates smallest discontinuities: Cracks 2×10^{-5} inches thick at center of 30-in. section. Locates lack of bonding: Areas ½-in. diameter or 1/16-in. below surface. Accurate to half the wavelength of used frequency. Locates subsurface defects.	All metals and alloys. Sintered carbides. Glass and ceramics. Rubber. Structural plastics. Concrete.	Rolling cracks, laps. Segregated inclusions. Poor brazing. Forging cracks. Corrosion pits. Improperly cured plastic lamination. Insulator cracks and voids.	Alcar Instruments Inc., Los Angeles, Calif. Automation Instruments, Inc., Pasadena, Calif. Branson Instruments, Inc., Stamford, Conn. Curtiss-Wright Corp., Princeton, N. J. Sonoflux Div., Peterson Machine Tool. Inc. Merriam, Kan. Sperry Products, Inc., Danbury, Conn.
High-speed inspection. Low-cost detection of surface flaws.	Practically all materials, if proper method is selected.	Surface discontinuities.	Magnaflux Corp. Chicago Sperry Products, Inc.
Can detect flaws ¼ inch below surface.	Iron and steel. Nickel. Cobalt.	Blow holes, cavities. Forging cracks, laps. Grinding checks.	Magnaflux Corp. Sperry Products, Inc.
Permits one-operation inspection of complex shapes.	Non-magnetic metals and alloys.	Surface cracks. Laminations. Poor bonding.	Magnaflux Corp. Met-L Check Co., Los Angeles Turco Products, Los Angeles
Simple equipment. Inexpensive.	Electrical insulators. Chinaware. Sintered objects.	Cracks in porous materials.	Magnaflux Corp.
Detects subsurface flaws. Easy to apply.	Glass liners. Glass-to-metal seals.	Cracks in glass coating. Defects within ¼ in. of surface.	
Can be adapted to high-speed production lines. Can be adapted to many comparative analyses.	Metals only.	Surface finish. Discontinuities. Dimensions. Incorrect material.	Metrol Inc., Pasadena, Calif. Magnetic Analysis Corp., Long Island City, N.Y.
Permits examination of hidden surfaces.	Deep holes. Internal threads. Assembled parts with small access holes.	Surface finish, defects, pits, and other visible irregularities.	American Cystoscope Makers, Inc., Pelham Manor, N.Y. Homestrand, Inc., Larchmont, N.Y. Kollmorgen Optical Corp., Northampton, Mass. Lenox Instrument Co., Philadelphia
Can be adapted to production-line checking.	Honeycomb panels. Nuclear fuel elements. Sodium-filled valves.	Distorted honeycomb cells. Poor bonds. Filling level.	Magnaflux Corp.
Permits visual analysis of buried defects.	Metals. Foods. Films.	Cavities, cracks, porosity, non-metallic inclusions. Foreign particles. Incorrect thickness.	Allis-Chalmers Mfg. Co. Balteau Electric Corp. Budd Co. General Electric Co. High Voltage Engineering Corp. Industrial Nucleonics Corp. Isotope Products, Inc. Mitchell Radiation Products Corp. Philips Electronics Inc. Picker X-Ray Corp. Westinghouse Electric Corp.

Turn the page

NON-DESTRUCTIVE TESTING
NON-DESTRUCTIVE TESTING
NON-DESTRUCTIVE TESTING

NDT at work in 9 plants

• A Pittsburgh manufacturer of low-pressure vessels formerly trepanned (grooved) his welds. By substituting x-ray inspection he saved $500 per tank. Investment in x-ray equipment and supplies amounted to $9000. But savings came from substituting lighter-gauge wall plate, requiring less deposited weld metal. An employee from the plant was trained as the x-ray technician. Result: In less than one year he had paid off his investment in new equipment—and made a better product.

• Du Pont developed a thermal test during the design of its original Hanford atomic reactor. The "frost test" method checked bonds between the clad and fuel material in the nuclear reactor fuel elements. Visual inspection was carried out over several days, at any time convenient. Although replaced now by ultrasonic testing, this new test hinted at yet untapped possibilities in non-destructive testing.

• The nuclear industry has created a new requirement—location of small pits on the surface of nuclear components. Otherwise, surface-connected porosity and discontinuities trap radioactive contaminants and become hazardous hot spots, endangering personnel. Liquid penetrant inspection is especially helpful here.

• A large chemical company uses portable x-ray equipment to check valves and fittings in its pipeline system. Corrosive chemicals flowing through pipes deteriorated fittings quickly. Now the pipeline inspectors can select corroded parts for replacement before breakdown occurs, rather than replace them on a statistical basis. This not only saves on shutdown time, but gets maximum use from fittings. Shutdowns are no longer required for visual inspections.

• An electronic tube plant routinely radiographs tubes. The purpose: to check position of components, plus quality of internal welds. This test does not replace electrical performance tests at the end of the production line, but it does indicate potential causes of unsatisfactory performance during service.

• Ultrasonic techniques can detect the laps, seams, rolling cracks, laminations, and inclusions in steel plates from ¼ inch to 12 inches thick. Discontinuities in the order of ½% of plate thickness are readily detected. Laminations less than 2/100,000 of an inch thick are also easily detected by these techniques. The same thing is true for all materials in sheet and plate form.

• One of the most important applications in the electrical industry for ultrasonics has been the inspection of cylindrical forgings, such as turbine spindles and generator rotors. These forgings vary from 6 to 60 inches in diameter; some weigh as much as 100 tons. Segregations of non-metallic inclusions of almost microscopic size, and reflecting areas of 0.003 square inches have been detected in all sizes of these forgings.

• A tubing plant inspects all tubing and bar stock on a production-line basis. Its properly adjusted eddy current machine detects flaws as small as 0.002 inch deep, 0.001 inch wide, and 0.020 inch long—at inspection speeds of 100 fpm.

• Small diameter tubing for the atomic power industry is used in heat exchangers, condensers, and steam generators. Inspection is to an acceptance level of 2% of the wall thickness. Both immersed and contact ultrasonic techniques can meet this requirement.

REPRINTS AVAILABLE...

of this FACTORY exclusive report

Write Reader Service Department
FACTORY, 330 West 42nd St., New York 36
35¢ for single copies
25¢ for 2-24 copies
20¢ for 25-99 copies
Ask for quotation on 100 or more copies

Pointers on specific NDT systems

ULTRASONIC

• For brightly lighted areas, pulse-repetition rate on ultrasonic instruments should be adjustable; cathode-ray screen traces must be bright enough for good visibility. To measure thick materials, time-sensitivity should be adjustable and gain varied automatically.

• Surface finishes exceeding 25 microinches reduce sensitivity of a sound beam. So do wavy, narrow, or radiused surfaces. Grooves, undercuts, and other surface irregularities can hide or mask defects.

• If you want a portable instrument, don't expect laboratory accuracy, ruggedness, or reliability. They are usually synonymous with heaviness.

• For close-up viewing, large cathode ray tubes are undesirable. They don't provide more picture information; instead, they indicate signals with lower contrast and definition.

• Check the dynamic range (ratio of max to min flaw indications) of the oscilliscope. For general use, the best ratio is 50 to 1.

MAGNETIC PARTICLE EQUIPMENT

• To locate fatigue cracks, crosswise to length of object, use longitudinal magnetization. Circular magnetization will not detect them.

• Use a-c current when looking for surface defects, d-c for subsurface defects. Select proper strength of current—too much magnetization may cloud indications. A rule of thumb: For each inch of space between prods, use 100 amperes of current.

• Don't forget to demagnetize aircraft parts, bearings, or parts subject to subsequent machining. In demagnetizing, keep axis of work pointed east and west. If you don't, the part will retain a component of the earth's magnetic field.

• An ultrasonic instrument intended for more than one application should be equipped with external intensity and focus controls. This will give the operator maximum latitude in selecting trace characteristics.

LIQUID PENETRANT

• Plan to clean material of oil films, grease, and dirt. Presence of water inhibits action of penetrant. Penetrant test materials must be kept free of moisture, too.

• Each part must be processed. This is not a mass production method that separates good from bad by throwing parts into a machine.

• To discover only small surface defects, consider this method. But choose another one if you suspect subsurface defects.

• Expect to wait (three minutes to an hour) while penetrant is working. Cutting this time short despite production requirements defeats purpose of test.

FILTERED PARTICLE

• Particles selected must be removable before next manufacturing process. For unglazed ceramics the particles must fire off before they affect the glaze.

• Avoid application of penetrant-particle suspension with brush. Spray, douse, or immerse object—surface must be saturated. A brush won't do the job.

ELECTRIFIED PARTICLE

• For surfaces not backed with metal, remember to use a conductant penetrant.

• Of the three powders—white, gray, and black—white is the most suitable.

• Temperatures above 140 F. will cause electrified particles to stick everywhere on surface.

EDDY CURRENT

• Don't expect absolute measurements, only qualitative comparisons with standard test pieces. Extreme sensitivity to many variables requires specially designed instrumentation here.

• Your biggest problem will be establishing standards, defining rejectable limits.

THERMAL TESTING

• If precise heat input to material or control of test environment is difficult, don't use.

REMOTE SURFACE

• Keep an eye on fiber optics for new developments.

RADIATION TESTING

• This method requires extreme care in handling equipment, avoiding personnel hazards.

• Don't overlook a good darkroom and darkroom techniques. These are as important in producing acceptable radiographs as is the primary equipment. In some cases they will be the source of 90% of your troubles.

• For high definition fluoroscopy, plan to get rugged equipment, rather than standard x-ray equipment. Look for protection against excessive tube current and over-voltage.

NON-DESTRUCTIVE TESTING

ATOMIC WAR ON COSTS

In the last three years, an intensive cost-cutting program at an industry-operated AEC facility in Ohio has brought about annual savings of over $9-million.

These savings weren't all in areas peculiar to the nuclear industry, either (we've eliminated those from this article). And the company's search for lower costs is still going on. Already, operating costs are down a full 28%. Here's one place where the taxpayer is getting his money's worth.

How come? The plant is being operated by a taxpayer—the National Lead Company. In a very real sense, the money it's saving is its own. And yours. More important, the ideas on these pages might show you how to cut some fat out of your own operations. Or spark other ideas that will.

Main product of the company's Feed Materials Production Center, near Cincinnati, is nuclear fuel for government reactors. The raw material (uranium) is very costly. The plant is an odd combination of a machine shop, a refinery, and an assembly plant, with special health and cleanliness problems thrown in for good measure. *If there was ever a plant with a few tips for everybody, this is it.*

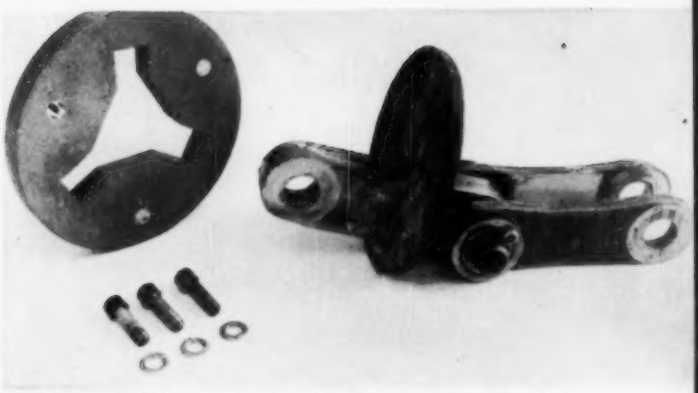
Prime mover behind the improvements shown on these four pages is an alert, well-run production engineering department, always hungry for new savings. But they don't try to be a one-man gang. Over 100 production supervisors attended formal classes in cost reduction (photo, right), then joined the search for savings. Here's a sample of the kind of results this plant-wide teamwork is producing:

CONVEYOR REDESIGN has cut maintenance labor 50%, slashed downtime, and is saving $7300 a year on replacement parts. A tubular flight conveying system is used for moving magnesium fluoride between operations. Abrasion forced frequent shut-downs for flight ring replacement. Each time, the conveyor chain had to be disassembled to rotate or remove the worn flight disk. Company engineers redesigned the unit (photos, far right), taking their cue from the piston rings in a car engine. The wear is now on easily removed (or rotated) outer rings, instead of on the edges of the flight disk. Rings are split, can be changed without taking the conveyor chain apart. Maintenance time, downtime, parts cost have all dropped.

SLUDGE DISPOSAL was streamlined at an annual labor savings of $6000. Sludge has to be removed from salt-bath heat-treating furnaces and processed to recover its uranium. Clamshell buckets were formerly used to load drums in which the sludge could solidify. Then the drums had to be slit open, and the solids manually broken into pieces that could be handled by crushing equipment. Now, the sludge is poured into steel molds (photo, bottom right) that operate like giant ice-cube trays. When the material hardens, the molds are inverted, and the sludge drops out in cubes, ready for the crushers.

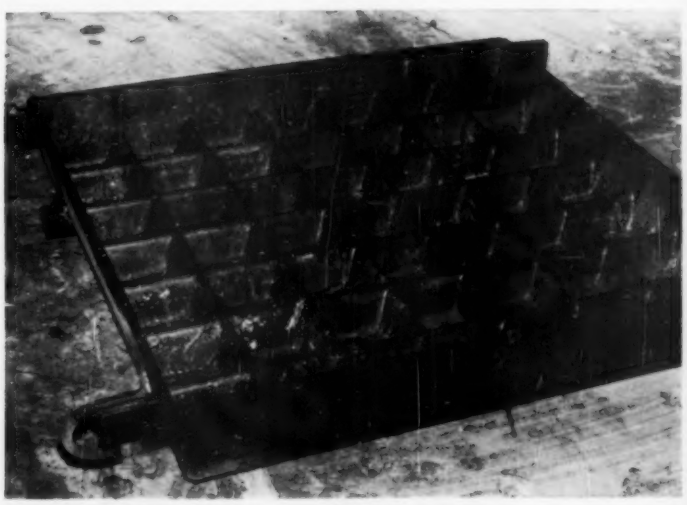
By M. S. NELSON, Assistant Plant Manager
National Lead Company of Ohio, Cincinnati

Turn the page



FLIGHT CONVEYOR had to be dismantled for repairs, but...

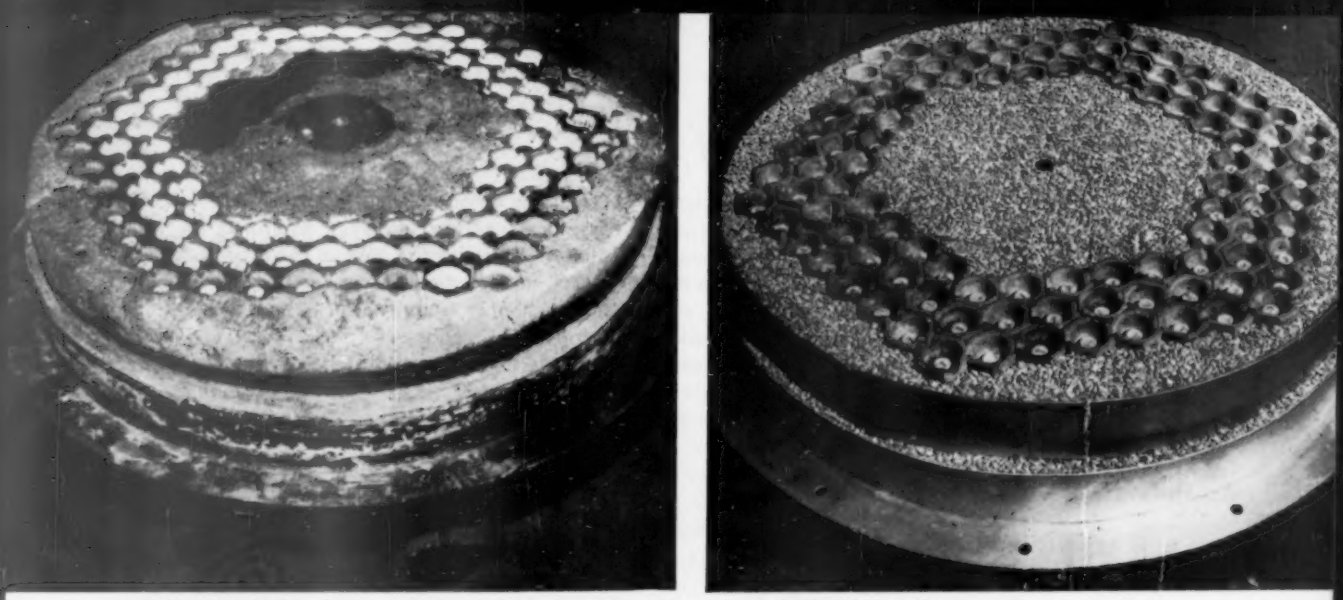
NEW DESIGN permits fast, easy replacement of parts.



SLUDGE DISPOSAL molds save **$6000** annually.

Cost-cutting techniques CAN *be learned. At this plant, supervisors took 20 hours of training, came up with ideas that already have saved over $100,000.*

TIME STUDIES are typical of efficient management tools used by National Lead at AEC facility.



MODIFIED BURNERS, right, solved a maintenance headache, saved $13,000 yearly per unit.

DRUM HANDLING has been simplified, knocking costs down some $24,000 a year. Steel drums are used all over the plant for transferring materials. For years, empties were shunted around by truck, with special labor crews handling and stacking them. Drum storage areas all over the plant were using up space. Costs of this one activity alone reached $48,000 a year. Now, low-slung trailers are loaded with drums and spotted, wherever needed, by tug tractors. The flat trailers double as storage bins, eliminating stacking. Drums are handled by whichever group is using them. Drum inventories are down, delivery is faster, more convenient. Biggest saving: no more special drum handlers.

WORK SAMPLING let National Lead's engineers make a nice swap: a small cost (once) for big savings every year. Example: A major step in making fuel elements at FMPC is rolling ingots into rods. A work-sampling study in the rolling mill area uncovered ways of combining work and reducing manpower without affecting production. Cost: $3900. Yearly savings: $89,000 in this one operation. Other time studies in the plant (photo, left) are saving $200,000 annually.

INCOMING INSPECTION was partially automated, for a 65% reduction in labor costs. Automation also doubled output and made the operation much safer. (Uranium is toxic.) Ore concentrates arrive in steel drums, each of which has to be weighed and sampled. The old way was to have men remove the lids, dig into the ore with a pipe or hand-fed auger sampler, put the lids back, send the drums on their way. Now, a power-driven auger screw, a dust collector, and a series of conveyors handle the sampling job in jig time, at lower cost, and with less dust hazard.

BULK HANDLING of hydrated lime saves $45,000 a year. Lime is used to neutralize acidic waste, but the former use of bagged lime was not economical. New bulk facilities permit buying at better prices, and saving on handling, transport, storage, and housekeeping.

A RELOCATED MOTOR cut maintenance costs by over $5700 a year. Chips are removed from the beds of multiple-spindle, automatic bar machines by inclined chip conveyors. Trouble was, the motor that drove the conveyor was at the lower end, exposed to chips and coolant. Inspection was difficult and repair even worse, because the motor was inaccessible. Machine downtime was too high owing to burnouts of the chip conveyor motor. Solution: Relocate the motor to the high end of the conveyor, out of harm's way. Now, inspection and repairs are a cinch—and less frequent.

MODIFIED BURNERS dropped upkeep costs from $18,000 to $5000 yearly per unit. Gas-fired pots are used to reduce an acid-uranium solution to "orange oxide," an intermediate product. The main burners consist of a large steel base, side plates, and three rings of gas burners. Formerly, space around the burners was filled with refractory cement (photo above, left). Whenever the pots leaked, the acid solution ran off the cement and into the burners, causing a lot of damage. The new method (above, right) substitutes crushed limestone—over a layer of soda ash—for the refractory cement. The limestone absorbs and neutralizes the acid. Plugged and damaged burners are less frequent, repairs easier and cheaper.

DRUM RECONDITIONING is now saving the AEC better than $70,000 a year. In addition to the usual problem of damage, steel drums at FMPC get contaminated by uranium-bearing materials. So it's important to recover these expensive deposits. Before the new facilities were installed, cleaning the drums was a tedious, costly job—washing, manual scraping, hammering, and the like. Damaged drums were just scrapped. Now, new equipment for shot-blasting, re-rolling, trimming, and painting is hard at it. Contaminating material is completely recovered and the drums are thoroughly cleaned and reconditioned.

MAINTENANCE— PILLAR OR PARASITE

An Editorial Commentary

BY CARL G. WYDER
PLANT MAINTENANCE AND ENGINEERING EDITOR, FACTORY

As early as 1929, Carl G. Wyder saw the need for management discipline in maintenance and plant engineering. He saw it, and still sees it, as an essential, profit-producing plant management function. Carl's relentless efforts have helped to raise this vital plant operation to its present status.

Are maintenance costs going up or down? We get this question often. Usually it comes from managers who are trying to project FACTORY's monumental 1959 report (February) on "What Industry Is Spending Today for Maintenance" into the future. We can't give a categorical "up" or "down" answer. Some factors tend to push costs up, but others work in the opposite direction.

Three elements that exert an upward push are these: First, there's a widely held feeling—probably valid—that the continuing trend toward higher mechanization and automation tends to boost maintenance costs. Second, any move to improve equipment availability and reduce downtime by raising the level of maintenance will certainly cost more (although over-all manufacturing costs may drop). And third, if basic maintenance labor and material costs persist upward, FACTORY's Cost Index will continue its long-term climb. Barring a drastic change in the national economy, these opinions make sense.

The upward cost trend can be bucked by strong downward elements. Biggest of these is a gain in efficient execution of the job—by better management of maintenance. Another is the growing availability of better materials for design of buildings and equipment. They promise longer life and less upkeep.

This alone will tell whether the downward influences—in any given plant—will over-balance the upward ones.

Yet not time alone. Because higher management can sway the pattern by foresight and wise decisions. How? There stands in the middle of this seesaw of up-and-down influences a man who can throw his weight either way. He's the maintenance head. In many plants he has been given the authority and responsibility for the management of his function. He can and does help push maintenance costs down. But in many more plants he's merely the repair manager who keeps equipment from breaking down, fixes it when it does. He has neither time, nor proper help and facilities to accumulate performance records or issue cost reports. What this man needs, as FACTORY has said many times before, is better recognition and status.

Let's dig deeper, and examine a few major areas where maintenance is powerless to cut its costs because it lacks proper status:

- Purchase of equipment. Often maintenance is never consulted. Its common complaint: "We could save thousands of dollars in maintenance if we could check new equipment before purchase."
- Design of equipment. There are scores of design opportunities for keeping maintenance costs down—simplicity of design for easy and fast inspection or repair; minimization of special parts or accessories; better materials that allow longer intervals between servicing or repairs; and many others.
- Layout of equipment. Maintenance is qualified to prevent many costly errors—such as the failure to allow enough access for servicing, repair, and overhaul; neglect of easy and safe maintenance procedures; omission of duplicate auxiliaries or in-process storage to keep equipment in production during servicing.

Now back to the first question of where maintenance costs are heading. Looks as though much of the answer depends on higher management. If it considers maintenance a pillar of plant operations, it can surely swerve the curve down. If it considers maintenance to be only a sideline and an irritating overhead, it will have a parasite that must live on operating profits.

What can be done in the maintenance function to trim manufacturing costs, insure bigger profits? This we can answer: Make the maintenance head a part of the operating management team.

Troubled by organizational smog, Ford takes bold action and...

PLANT ENGINEERING GETS A PLACE IN THE SUN

What are the responsibilities and duties of a plant engineering (PE) department?

In an industry-wide survey two years ago FACTORY tried to shed light on this question. We found there was no uniformity in internal organization or titles, or with regard to the individual to whom the department head reported.

Recently, Ford Motor Company acted on the need to define and firm up responsibilities of its manufacturing staff, division, and plant organizations. As a part of this program it devised typical organization charts and spelled out the responsibilities of its various manufacturing managers. These were documented in multi-page reports. The reports are used to familiarize supervisors with manufacturing operations and central staff relationships.

The place awarded plant engineering in Ford's organizational solar system is shown in detail on the following page.

Says Ford (and we quote directly from its impressive report):

. . . Plant engineering has a primary role in design, construction, operation, and maintenance of buildings and facilities.

. . . It is responsible for installation, rearrangement, and maintenance of the company's machinery, tools, and equipment.

. . . The principal areas of functional responsibility of the plant engineering work force are: Maintenance control, maintenance, powerhouse, engineering and design, and administrative.

. . . At plant level, plant engineering has three departments: engineering and construction, maintenance, and engineering services.

. . . As members of a staff group, plant engineering personnel must understand their relationships with the line organization and achieve a high degree of staff competence in performing their functions.

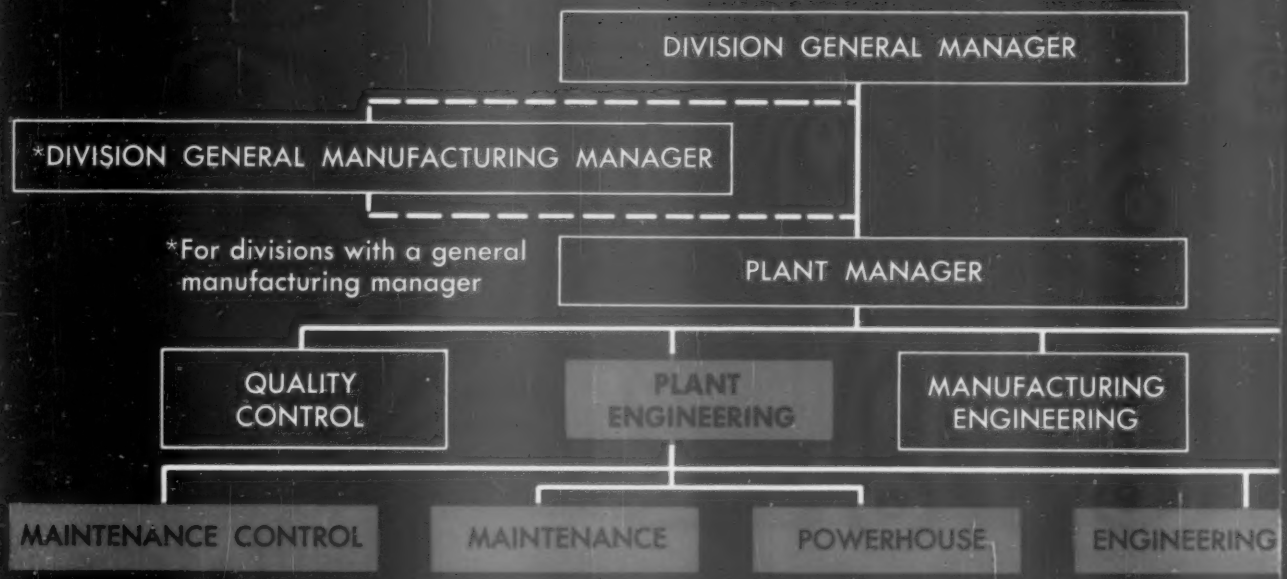
. . . The future will demand plant engineering personnel in expanding numbers and with increasing skills and abilities, who can effectively perform functions of growing complexity.

These 60-odd functions are shown on the following pages. They fall into five major functional areas.

FACTORY believes the Ford approach can help you survey your organization. With it, you can tighten or broaden, as necessary, the lines of responsibility of the plant engineering function.

But we offer this information with a note of caution. The Ford organization, while best for Ford, may not necessarily be the best one for you. There are major industries, for example, that prefer to segregate the plant engineering and maintenance functions under separate heads. And they seem to have good reason for it. The important thing to observe here is that functions are assigned as a definite responsibility—as they should be. And make sure you apply similar judgment to those plant engineering or maintenance functions peculiar to your industry—those that may not be included in Ford's analysis.

Turn the page



. . . At Ford, organization changes give PE new position (chart), better

MAINTENANCE CONTROL

1. Organize and conduct surveys of machinery and equipment; prepare preventive maintenance check sheets for components to be inspected; and establish frequency of inspections.

2. Prepare machinery and equipment repair record cards for each piece of machinery and equipment within the facility, including industrial trucks and tractors, showing tag number, age, location, inspection schedules, lubrication and overhaul frequencies; maintain these record cards to indicate repairs made and costs incurred.

3. Establish inspection routes and schedules to provide an even distribution of work. Schedule inspections at regular specified intervals. Establish a tickler file to control the issuance of check sheets according to schedule.

4. Assign qualified craftsmen to conduct regularly scheduled preventive maintenance inspections of machines, equipment, buildings, grounds, utilities, utilizing check sheets. Make minor adjustments.

5. Review inspection reports and issue necessary maintenance work requests or work orders to correct defects discovered. Follow up to assure that required repairs have been completed.

6. Periodically analyze all machinery and equipment repair cards to determine the cause of excessive maintenance costs in order to eliminate excessive maintenance expenditures.

7. Analyze production downtime reports and initiate investigation of measures required to correct excessive downtime.

8. Conduct indoctrination sessions as the improved maintenance and cost control program is developing to acquaint personnel of all departments with the objectives and operation of the program.

9. Analyze details of plant engineering costs; take the necessary action to assure that maintenance methods are efficient and economical, and compile appropriate reports of maintenance costs.

10. Submit periodic bar charts of the performance of maintenance operations; include the following data:

(a) Production downtime

(b) Maintenance expense (include labor and materials as applicable):
- Cost of preventive maintenance inspections.
- Cost of preventive maintenance repairs.
- Cost of emergency maintenance repairs.
- Cost of lubrication operations.
- Cost of cleaning operations.
- Cost of improvements and rearrangements.
- Cost of overhauls.
- Cost of overtime penalty.
- Cost of total maintenance.

(c) Utility expense—cost of steam, electricity, air, water, fuel, etc.

(d) Maintenance labor backlog.

11. Review and recommend maintenance labor standards for routine and recurring maintenance.

MAINTENANCE

12. Select and train qualified personnel to carry out the responsibilities and duties of maintenance function, and to provide adequate replacements of skilled workers.

13. Develop effective planning and scheduling of all maintenance work.

14. Arrange for release of production machines and equipment and industrial trucks and tractors in order to accomplish planned maintenance.

15. Maintain, repair, and overhaul production machinery and equipment, portable power-driven tools and material-handling equipment (these should include industrial trucks and tractors) in order to maintain all required units in good operating condition.

16. Repair and overhaul heating, ventilating, air-conditioning, air-filtration, refrigeration, and electrical and powerhouse equipment.

17. Maintain and repair all buildings, grounds, utilities, furniture, and office equipment; also kitchen and cafeteria equipment.

18. Install, rearrange, or remove machinery and equipment to provide for the requirements of production.

19. Review specifications issued for the procurement of new machinery, equipment, and processes to assure that maintenance requirements are met.

PRODUCTION CONTROL

& DESIGN | ADMINISTRATIVE

defined functions (text).

20. Select and provide for the application, at regularly scheduled intervals, of the proper lubricants for all machinery and equipment.

21. Concur in and approve the disposal schedules of paint spray-booth water, spent soluble oil, industrial washer solutions, and Bonderite solutions.

22. Initiate and maintain conservation programs for the efficient use of lubricating oils, greases, cutting and drawing compounds, and hydraulic oils.

23. (a) Provide plant-wide cleaning services for machinery, equipment, and process systems, such as spray booths, soluble oil tanks, washers, Bonderite tanks, dust collectors, ducts, etc.

(b) Provide plant-wide sweeping and sanitary services.

24. Collect, segregate, and dispose of combustible wastes, scrap metal, and salvable material.

25. Analyze scrap reports to determine and repair faulty machines that produce above-normal amounts of scrap.

26. Determine for budget purposes the total annual maintenance work load for optimum maintenance of all machines, equipment, buildings, grounds, utilities.

27. Develop data for incorporation into local and company-wide maintenance procedures and standards.

28. Initiate requests for maintenance tools, maintenance supplies, special replacement parts for machinery and equipment necessary for the maintenance operation.

29. Prepare spare parts required for machines and equipment; revise spare parts lists as required; monitor the spare parts and maintenance materials conservation program.

30. Assure that inventories of spare parts maintenance supplies and special replacement parts are maintained at an optimum level.

31. Maintain safety control devices and enforce accepted safety standards for ovens, furnaces, and like equipment.

32. Coordinate the shop trials and laboratory tests of maintenance materials.

33. Establish and operate the maintenance shops.

34. Operate and maintain the caustic cleaning building.

POWERHOUSE

35. Select and train qualified personnel to perform the function of the powerhouse activity.

36. Operate powerhouse equipment and provide all utility services as required by the plant.

37. Operate, service, adjust, and perform minor repair of the heating, ventilating, air conditioning, air filtration, refrigeration, and other utility systems of the plant.

38. Establish and maintain conservation programs for the efficient use of fuels and utilities.

39. Service, adjust, and perform minor repair of powerhouse equipment, waste and sewage treatment facilities, pump houses, cooling towers, oil reclamation facilities, and the like.

40. Establish and maintain scheduled shutdowns to permit the inspection and repair of equipment.

41. Arrange for vendor's assistance for the inspection and repair of special equipment beyond the skill of the regular force.

42. Operate waste and sewage treatment facilities, pump houses, cooling towers and oil reclamation facilities, as applicable.

43. Maintain utility usage records and provide management with appropriate utility reports.

ENGINEERING AND DESIGN

44. Select and train qualified personnel to perform the functions of the engineering and design activity.

45. Provide engineering for equipment installation or rearrangement, including foundation and pit design, as required; analyze the effect on the plant structure.

46. Supply engineering for utility services for equipment in accordance with approved plant layouts.

47. Provide engineering and minor revisions or additions to plant structures and related services.

48. Supervise the work of outside contractors when such services are required for equipment installation, revisions to utility systems, building equipment and site improvements. Act as resident engineer for construction projects, as assigned.

49. Review and concur in plant layouts and equipment design for effect on structures, utility systems, compliance with fire prevention and safety standards, traffic flow, and exit requirements.

50. Maintain current drawings of buildings, site improvements, utility systems, and building equipment.

51. Provide cost estimates and project detail for all revisions to buildings, site improvements, utility systems, and building equipment.

52. Prepare estimates and engineering, as required, of non-recurring maintenance work, modifications, overhauls, and rebuilds of machinery and equipment.

53. Analyze quotations for revisions or additions to plant engineering items when quotations are received at the plant. Recommend contractor or supply source.

54. Maintain accurate and detailed cost records of all work done under the supervision of the section or from engineering supplied by the section.

55. Assure that work controlled is in accord with company standards.

56. Supply information for manufacturing standards.

57. Maintain liaison with local government bodies regarding conformance with all laws and building, electrical, and plumbing codes relating to public health and safety.

ADMINISTRATIVE

58. Prepare and expedite contract documents, purchase notices, purchase notice revisions, work orders for construction and rearrangement, and review invoices.

59. Assist in the preparation of the department budget; administer the budget and analyze variations.

60. Provide all office and personnel services required by the department; coordinate plant engineering evaluation of employee suggestions.

61. Assure that department reports are accurate and released promptly.

COVER STORY When it comes to budgets, many's the operating manager with a sad song to sing. Especially maintenance managers. When the sharp-pencil boys are finished, the plant is often due for *minimum* maintenance. True, this helps save pennies. But the pennies saved are reflected in dollars lost to the over-all operation—through downtime and lack of money-saving improvements.

Not so at the Krummrich plant (Monsanto, Ill.) of the Organic Chemicals Division of Monsanto Chemical Company. There, a well-managed budget system encourages proper plant and equipment upkeep and profit-making improvements. Of course, this doesn't mean the maintenance manager gets a blank check. He must justify his expenditures. But he has freedom to use his engineering and managerial skills to optimize—rather than minimize—his maintenance costs.

REPAIR BUDGET

1. Evaluating the budget needs of a new department at the site are (left to right) R. E. Soden, plant manager; Ray Stratmeyer, general maintenance superintendent; H. L. Minckler, divisional manufacturing director; and (stooping) W. E. Chandler, manager of maintenance and engineering. **2.** Maintenance men

FOR A GIANT JOB . . .

The maintenance job at Krummrich is no sinecure. The plant operates 24 hours per day, 7 days a week. It covers about 100 acres of activity, and manufactures about 70 heavy-chemical products in about 50 segregated departments. Much of the facility is made up of batch and continuous process tanks and towers, reactors, kettles, pumps, and instrumentation. There are criss-crossing networks of all kinds of low- and high-pressure piping and electrical power lines. Chemical corrosion eats up the innards, atmospheric corrosion attacks the exteriors. To combat these physical and chemical forces of destruction requires a maintenance department of over 500 men. The current Krummrich repair budget runs about $5-million. (Current year-to-date performance is within less than 1%.)

CLEAR OBJECTIVES . . .

The broadened viewpoint on maintenance management had its beginnings in 1958. W. E. Chandler (then newly appointed manager of maintenance and engineering) began a study of the future maintenance needs of the Organic Chemicals Division. Because maintenance costs constitute a significant portion of direct conversion costs of plant products, budgeting of this expense—for better performance—was one item due for an overhaul.

The maintenance budget objectives are: (1) to minimize the maintenance cost and (2) to optimize mechanical availability (ratio of hours on stream to hours of downtime caused by mechanical failure).

Krummrich knows anyone can cut maintenance costs just by not doing the work. At the other extreme, the effort to attain near 100% mechanical availability in this type of operation would be too costly.

Somewhere in between is the point of best return. And for proper budget development, that point must be clearly identified. After careful study by Chandler, management at Krummrich selected 95% mechanical availability (composite of all equipment) as the optimum. This decision was based on three main factors: (1) historical performance, (2) production loss dollars at 5% mechanical downtime versus repair costs, and (3) installed value of capacity.

CLEAR RESPONSIBILITIES . . .

Pinning down objectives brought a long-standing problem to light. As in many other plants, the maintenance manager's authority did not match his responsibility. Also, he was capable of being charged with costs over which he had no control. "Without cost accountability," argued Chandler, "budgets mean nothing. You have to be able to control input of the work. And you have to make sure you are charged only for the work you can control." The solution clearly lay in the establishment of new and well-defined maintenance responsibilities, and in the revision of cost accounts to reflect true maintenance costs.

DEFINED COSTS . . .

If the maintenance manager was to be held accountable for costs, they needed definition. What dollars are spent strictly for maintenance? What work done by the maintenance function is not maintenance, and how is it charged?

SPURS PROFITS

display time-saving new keyslotter purchased on previous budget. **3.** Results of new planning and scheduling procedures are explained to Chandler by Superintendent Joe Seidel. **4.** Paint Supervisor Ted Stanley (left) projects budget needs. **5.** New area-stores-in-a-trailer affects budget by cutting lost time.

The Chandler study culminated in the development of the cost chart below. Of all expenditures and losses, only the three marked with asterisks are subject to control by maintenance.

ELEMENTS OF COST

Mechanical expenses: repairs*, plant improvements, work to assist operations, earnings expense.

Capital expenses: maintenance*, plant improvements earnings.

Dismantling expenses: plant improvements, all others.

Miscellaneous mechanical expenses.

Downtime losses: mechanical*, process.

* These items make up "true" maintenance cost.

This fact becomes clearer if we examine the Krummrich definitions of all the classifications of the above expenses:

Mechanical expenses—Those charged directly to "cost of goods sold." Four subdivisions in this section are as follows:

• Repairs. All expensed mechanical costs for protecting or prolonging the life of the investment of the physical facilities of the plant; or for keeping production on stream from a mechanical viewpoint; or for minimizing the future cost of doing any of these things.

• Plant improvement expense. Expensed mechanical costs directed toward improved working conditions, safety, plant appearance, and so on, that are not justified on a direct dollar return, and that are not "repairs" or "work to assist operations."

• Work to assist operations. All expensed mechanical costs for operation of departments as opposed to equipment maintenance, plant improvement, or earnings expense. For example: routine product changeovers, unplugging lines, cleaning filters, loading and unloading operating materials or supplies. This category also includes cost for the reduction of such expenses.

• Earnings expense. Any mechanical expense that is wholly justified on a direct dollar return, except that if the return is in reduced repair cost or mechanical downtime the expense is to be classified as repairs. Or if the return is in reduced "work to assist," the expense is to be classified in that category. For example, the relocation of a value to produce better yield is earnings expense.

Capital expenses—Mechanical costs acquired in the installation of new or replacement units of property. Maintenance capital expenditures are of two types: a direct replacement in kind to reduce repair costs or improve mechanical availability.

Dismantling expenses—Mechanical costs involved in dismantling existing units of property, either permanently or in preparation for replacement.

Miscellaneous—Includes costs that become a part of insurance claims, in-plant fabrication of items for stores inventory, and any other mechanical costs not to be charged directly to cost of goods, reserve accounts, or property accounts.

Use of these classifications has fulfilled the prime aim at Krummrich of making the maintenance function responsible for only maintenance costs. Now, about 75% of all mechanical expenditures are defined as maintenance items.

Downtime—This is the other item affecting cost of goods sold. It occurs whenever production is not 100% on stream. (This concept, of course, can be readily applied to any type of manufacturing plant—for example, to product flow at an assembly line.)

There are two types of downtime at Krummrich: (1) mechanical, as when a pump fails, and (2) process (or production), as when a line plugs up because of the process. Both losses are finitely measured by conversion of downtime hours to output (pounds, for example), then to dollars by application of a weighting factor based on standard manufacturing labor costs.

Who is responsible for downtime? Krummrich reasoned mechanical availability is solely the outcome of maintenance behavior, but process downtime is chargeable to production. This new view answers the age-old question of how much each function is responsible for losses in output. "Without making maintenance accountable for its rightful share of downtime," emphasizes Chandler, "you cannot get the best maintenance performance."

Turn the page

Along with clear cost responsibility—clear authority

Maintenance at Krummrich is no longer a service department. The general superintendent of maintenance reports directly to the plant manager, along with three other general superintendents of production and technical service divisions. He must answer to top management for mechanical availability and true maintenance cost. Therefore, he needs and gets statistical reports on both to help him make decisions. For example, Departments A and B may show mechanical availabilities of 92% and 75%, respectively, but downtime losses of $50,000 and $5000. Obviously, Department A is the one that should get first attention.

The decision as to which department he will concentrate on is up to the maintenance manager. This is the point where Krummrich (and other Organic Chemical Division plants) differs from the conventional set-up in most plants today. This type of authority implements the maintenance manager's responsibilities. He decides not only what repair work to do, but also when. He is able to control repair work input, hence budget performance.

Here's how this philosophy works out in the plant: Suppose an operating superintendent asks for relocation of a valve to improve operations. This is not a maintenance repair. It's purely an operating decision, so it's written up as a plant improvement. But maintenance is held responsible here and always for efficiency of work execution and project control.

Now suppose the operating superintendent merely claims that the valve needs immediate maintenance attention. This is a maintenance decision, to be made after a review of all the facts. Maintenance may decide that the repair could be safely delayed until a later overhaul. Again, suppose there are no operating complaints, but maintenance decides that the valve is a source of high maintenance costs. The maintenance manager then has the authority to replace it with a different type of valve. However, he must check with the operating manager to make sure the new valve will satisfy all process demands.

This careful distinction of responsibilities doesn't imply a constant tug-of-war between operating and maintenance managers. It does create a respect for one another's authority, and the realization of a need for teamwork among all departments, to keep down the cost of goods sold.

How Krummrich sets up its maintenance repair budget

Preparation of the "repair" portion of the budget is a line function. It's not an "outside" accounting prescription. The maintenance manager and his many supervisors and five departmental superintendents draft the proposed figures for each of their activities. In short, the maintenance organization gets first crack at recommending the budget figures.

They are developed with the basic aims always in mind of maintaining a composite 95% mechanical availability and of protecting the investment at minimum cost. But here are points where Krummrich differs from most plants:

- Budget is made on a lump-sum, annual basis. The breakdown by months, usually a one-twelfth basis, is done after approval.
- Budget is not changed once it is approved. But itemized costs are scrutinized monthly on a year-to-date status of actual vs. budget to maintain control. Performance is evaluated only at calendar year end. Any attempt to equalize each month leads to over-control, and prevents a job, such as a costly overhaul, being done at the most efficient time.
- Budget deviations for unpredictable expenditures—or even oversights—are evaluated for justification. Budget is not cut off at a fixed point.

Krummrich budgets annual repair costs on a specific total-dollar basis, not on a unit-production basis. It considers a forecast of level of operations in sizing up maintenance requirements. But the relationship of output to maintenance cost is non-linear. What counts more is whether it's 6 months' steady operation and 6 months down for the whole year, or 4 days' output every week all year, and so on. Moreover, if production is shut down, this is usually the time to spend more maintenance money.

Up to now, Krummrich has not budgeted its capital outlays. It records the total of capital projects approved, rather than actual cost accruals. Thus, it still gets an over-all view of all true maintenance costs. What follows, therefore, deals only with the problem of budgeting of repairs.

Budget preparation—It's done at four levels, beginning at the plant supervisory level and ending with top management approval. You might ask, what do supervisors know about maintenance costs to qualify them for realistic appraisal of repair needs? "Maintenance costs are a living thing at Krummrich," boasts Ray Stratmeyer, general superintendent of maintenance. "Everybody up and down the line knows exactly what our costs are."

The fact is, all supervisors get monthly cost reports gauged to their needs. The maintenance department is organized along two main lines: (1) plant-wide maintenance of certain functions or facilities by equipment specialists, such as for buildings, painting, insulation, and instruments; (2) area maintenance of all else (with

central shop support) in specific geographical plant areas. To keep both groups fully informed, maintenance cost codes are broken down for each unit of plant equipment, and labor and material on work orders are reported by unit, class of equipment, and department. This permits a variety of cost reports in whatever concentration of facilities or depth needed. For example, costs are available for each pump, or for all pumps in any one department, or for all pumps plant-wide. Totals also are available for each class of equipment in any one department, or in any geographical area of the plant or grounds.

But can a maintenance budget built strictly on the cost experience of previous years reflect all the tangible and intangible improvements planned for the coming year? Can it take into account lower costs emanating from use of better tools, better materials, better methods? Krummrich agrees it can't be done, and therefore doesn't prepare the budget that way. It builds two trial budgets, one from the viewpoint of actual physical plant requirements, the other to reflect improvement aims. Then it reconciles both trials into a finalized budget.

First trial—This approach is intended to reflect a "must-have-for-good-maintenance" goal. Each supervisor adds up the needs of each of his units of physical equipment (by equipment function or department, as the case may be). He submits detailed dollar estimates. He ignores expected changes in wage rates, material costs, and labor utilization efficiencies. But he does take into account all moves in corrective maintenance (such as a change in a pump that will cut future maintenance costs) and in preventive maintenance (as when a regularly scheduled system for pump checks reduces shaft wear). Wage rate and other adjustments are made later in a single adjustment of the lump sum, thus avoiding the need for each supervisor to factor these items into his individual computation.

By this method the men begin with actual cost data for the current and previous year. Their attitude: What will be different next year? Proposals are based on these considerations:

- Historical costs—what happened in previous years that went up or down.
- Additions, deletions, or changes of facilities.
- Improvement programs planned for the equipment.
- Level of operations as affecting wear and tear and scheduled downtime.
- Need for periodic overhauls.

In the case of new equipment having no cost history, the budget is estimated on the basis of associated knowledge and related experience, also study of new or unique points.

The resultant "branch" estimates are then summed up to get various sub-totals and totals. This is purely a clerical exercise. The purpose is to stratify the data to conform to organizational lines of responsibility for comparison with equivalent subdivisions of previous budgets.

Second trial—Purpose here is to erect a target that reflects an "improvements-we'd-like-to-get" viewpoint. The maintenance manager and certain of his staff study the five basic elements of all maintenance cost, namely, labor, labor overhead, material, material overhead, and contracts. Using the current annual budget as a base, they take an over-all look at what effect the following considerations will have on the new budget:

- Expansion in facilities (or discontinuance).
- Improvements in manpower utilization.
- Wage rate outlook.
- Changes in material costs, stores handling.
- Need for more or less supervision.
- Need for staff improvements—as for PM and CM.
- Changes in methods and procedures.
- New shop tools.
- Building-trades wage trends.
- Amount of contract work.
- FACTORY's Cost Index implications.

These influences are all thrown in the hopper to grind out an opinion on how much improvement can be expected next year in over-all performance. The result yields a total dollar figure usually different from that developed by the first method.

Final budget—First move is to reconcile the differences between the "must have" estimate and "would like" estimate. Big question now is: "How much improvement should we actually shoot for?" The answer will set the top limit to which the total must be pared. To get it, the maintenance manager and his staff examine all influences over both trial totals, some plus and some minus, to decide which proposals to keep, which to discard. It's a case of belt tightening, with the attitude of "pick the items that provide the best payoff—we can't have them all."

When all the influences have been evaluated and acted upon, the decisions are worked in detail into the "must have" budget. The components are adjusted to add up to the agreed total, so the accounting department can report the variances for each class of equipment or for plant-wide or area groups during the next budget year.

Budget approval—The budget now goes to the general office for approval. It is delivered first to the manager of maintenance engineering services (Chandler) who scans it carefully for its aims and realism and checks inclusion of all plant programs.

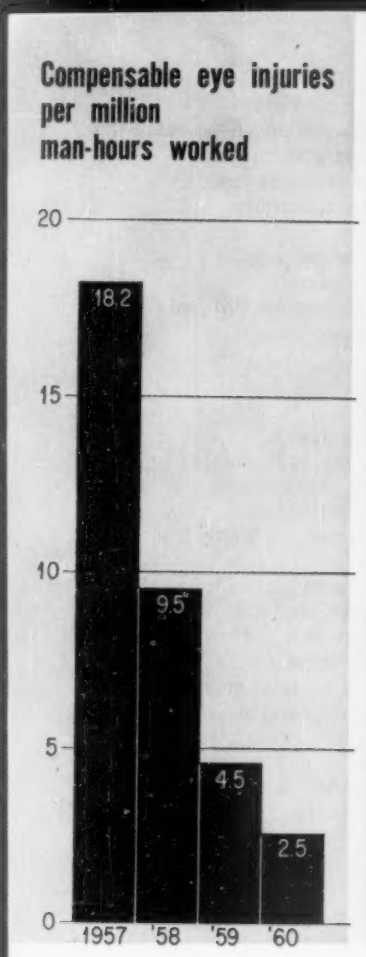
After this screening the budget goes to top management for approval. What if top management should demand a cut to accord with its over-all financial views? Krummrich makes the point that whereas 10 years ago the cut would have been flatly distributed across the board, it now knows where it can cut to hurt the least. What's more, the decision of where to cut would be left to the maintenance manager. He would only be told how much to cut, with the instructions "you figure where to take it out." There could be no better evidence than this of top management's recognition of the contribution the maintenance manager can make to the plant economy.

Here's how operating managers view the new budget:

Robert E. Soden, plant manager: "It provides a base line for control against pressures to cut it below the goal as well as to exceed it."

Howard L. Minckler, divisional director of manufacturing: "As now conceived, this budget helps establish standard product costs. It stimulates aggressive programing of maintenance."

Ray Stratmeyer: "Our budget posts us on how many men we need, sets the course. We couldn't manage without it!"



EYES SAVED ARE DOLLARS SAVED, TOO

Eye protection isn't a costly plant luxury. At Twin Coach Company, Buffalo, a revitalized program is saving thousands of dollars. Here are the cost facts:

• **Manpower savings** average $250 per month, due to the reduced number of eye injuries now occurring in the plant. Prior to the program they ran as high as 400 per million man-hours worked. By June of 1960 they had fallen to less than 70 per million man-hours.

• **Insurance savings** average about $358 per month, based on a reduction of approximately 50 compensable injuries per year. Those 50 saved injuries reduce estimated yearly losses by $4300. And to date at least one eye has been saved from severe damage, which would have run up bills of $2360.

• **Indirect savings** in production—though hard to put a price tag on—have resulted from all employees wearing proper glasses. Men who complained they couldn't see properly with safety glasses were given vision tests by the company. In most cases the tests revealed a need for prescription safety glasses.

Twin Coach also has a program now that insures up-to-date eye examinations for all employees. The company controls the quality of lenses and the fit of all eyeglasses—prescription and plain. The certain result: better vision in the plant, and savings in scrap and production costs.

A HAZARDOUS PAST...

In the early 1950s, frequency of eye injuries at Twin Coach was six and one-half times higher than the average for all manufacturing. With an average employment of 300, eye injuries (mostly foreign bodies) ran 15 to 20 per shift, with out-of-plant medical attention required on about one injury per day.

During this period, non-prescription safety glasses were available to all employees free of charge. Most employees had from one to three

pairs. These were dispensed through the plant medical department, but were not fitted to the individual employees. Those who wore prescription glasses usually wore their dresswear glasses on the job. Although employees could purchase safety prescription lenses at a discount, very few of them did.

NEEDED DIRECTION...

The core of the problem: little or no attempt by management to enforce the use of eye-protective devices, or to educate the employees on eye safety.

Then, in 1957, management and union decided to cooperate in a program to improve the eye-injury record. Management hired a director of safety (the position had been vacant for 10 months), appropriated $2500 for a 100% eye-protection program, and met with the union officers and their grievance committee. It explained the program, and asked the union to make suggestions.

UNEXPECTED RESISTANCE...

The union response to management's program was a surprise. Due to a change of union administration while the program was being developed, it resisted the program, even though it had helped to initiate it.

- It believed the proposed 100% program to be unnecessary.
- It opposed any inclusion of disciplinary action.
- It opposed having the employee pay anything toward the cost of prescription safety glasses.
- It objected to the rule on wearing glasses in the plant before and after the shift.
- It questioned management's right to institute the program for any employees with more than 30 days' seniority. Union officers wanted to wait and write the program into the contract at regular negotiation time in June, 1960.

Three of these problems were solved in discussions. The items of disciplinary action and employee payments for prescription glasses remained. However, management felt the problem was too important to delay, decided to inaugurate the program anyway. To implement the program, supervisors were asked to set an example and enforce the new 100% protection rules. They were fitted with safety glasses first. In the meantime, a letter was mailed to each employee's home explaining the program. The letter appealed to the employee's personal need for security through job safety.

One month later a grievance was filed. The complaints:

- Glasses were alleged to be of poor visual quality.
- Employees had to pay the cost of eye examinations.
- Employees had to pay part of the cost of prescription glasses.
- Disciplinary action for failure to comply with the new safety rules was a contract violation.

SUCCESS AT LAST...

Progress on the grievance was finally made when the international union's business agent entered the scene. Sample glasses were given for examination and evaluation. They proved to be of good quality. And the business agent convinced the local committee that a discharge for failure to wear eye protection would still permit grievance action on behalf of the discharged employee, under terms of the current contract. Later, the union dropped the issue of employee payment for prescription glasses. Management had contended that these need not involve any extra cost to the employee, since the company would provide, free of charge, plain safety glasses or coverall-type goggles to fit over dresswear prescription glasses.

The following month, when employees failed to comply with the rules, eight written warning notices were issued in one plant, and four in another. These were withdrawn a week later when no further evidence of non-compliance was noted. A gentleman's agreement between union and management had been reached.

AND THREE CLEAR RULES

What Twin Coach did could be done by any plant that does not now have an eye-protection program. It points up three important elements in program installation:

1. Courage. Twin Coach demonstrated it when management stuck to its guns in the face of union opposition. In the end, the international representative supported management's view. (In the experience of FACTORY editors, this support is common in cases that are genuinely in the interest of safety.)

Management also demonstrated courage in enforcing the safety rules. This is easier said than done, especially in a plant with a long habit of safety carelessness. The daily pressure of other jobs and the desire for high morale can easily get in the way of enforcement.

2. Communications. During the campaign, Twin Coach kept employees informed of what was going on—and why. The sad record of eye safety in the company was posted on bulletin boards. So were the announcements of the program and the program rules. Letters sent to employees' homes appealed to their instinct for self-preservation.

3. Cost consciousness. To humanitarian reasons for the program, Twin Coach added the vital dimension of cost in its basic framework. Result: a better program, better justified in the eyes of management, with cost consciousness built in. It has set an example any company would benefit from following.

MORE!

SHOW OF SHOWS for plant managers with an eye to better operations, the 12th annual plant maintenance and engineering show and conference will be held this year in Chicago. A complete guide begins on p. 121

BREAD-AND-BUTTER ideas that can easily be adapted for your plant are collected in these 12 fast-reading pages. They're engineered to save you money on everything from materials to inventory control. p. 229

★
COME TO THE SHOW
★

PLASMA FLAME TORCH cuts like a hot knife slicing butter—makes high-quality cuts at high speed. p. 88

TALKIES dramatize world-wide communications, fire control, welding equipment and techniques. p. 213

SHORT CUTS and cost-cutting ideas are major features of the 56 catalog reviews that start on p. 216

ACOUSTICAL CEILING PANELS give rated fire protection, sound absorption, insulation. p. 243

INDUSTRY needs testing method to revitalize atrophied abilities of its managers. p. 118

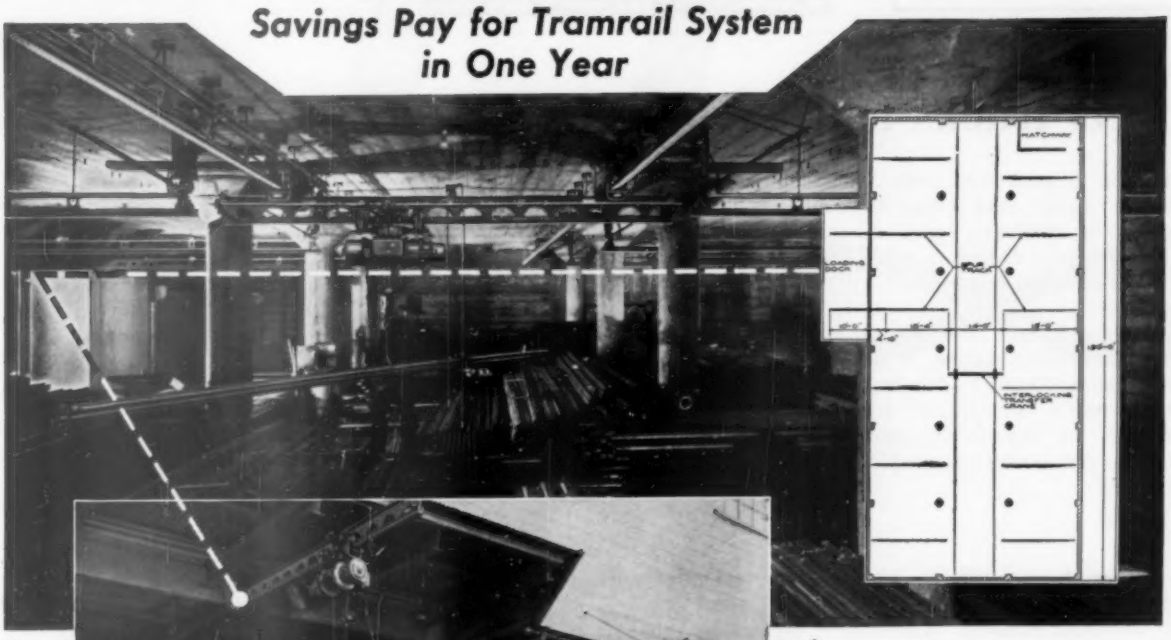
PACKAGED CLEAN ROOM is as pure as tomorrow's snow at a price you can easily afford. p. 189

PROVOCATIVE quotes from the world of labor relations is a new addition to this department. p. 200

AUTHORS' efforts are treated with respect by our industrial book reviewers. p. 206

Reduces Pipe Handling Time by 83%

Savings Pay for Tramrail System in One Year



▲ The Tramrail transfer crane travels in the middle bay and connects as desired with the spur tracks over the side bays, thus enables the hoist carrier reaching every part of the room. Incoming pipe is lifted from railroad cars with a Cleveland Tramrail hoist carrier operating on a track serving the floor above and lowered through the hatchway at one end of this warehouse.

◀ Outgoing pipe is brought directly from storage to trucks. The hoist and entire system is rated at one ton.

SEVERAL hundred tons of 1/8 to 16 inch diameter pipe are received at the Pipe Warehouse of Palmer Supply Co., Seattle, Washington, per month. To handle this by hand was such a loathsome chore that it was difficult to keep men at this work, and the labor turnover was large.

The installation of a Cleveland Tramrail track and transfer crane system took over the fatiguing job of lifting, as well as hauling, of the pipe into and out of the warehouse. It made possible the handling of large, heavy bundles per trip in less time than required for one or a very few pipes by manual handling. It thereby reduced the man-hours required for pipe handling to approximately one-sixth. Resulting dollar savings paid for the system in one year.

Cleveland Tramrail equipment offers you so much and pays off in so many ways for such a long time that we urge you to study its possibilities in your plant.

GET THIS BOOK!

BOOKLET No. 2008. Packed with valuable information. Profusely illustrated. Write for free copy.

CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO.
3207 East 290 Street, Wickliffe, Ohio

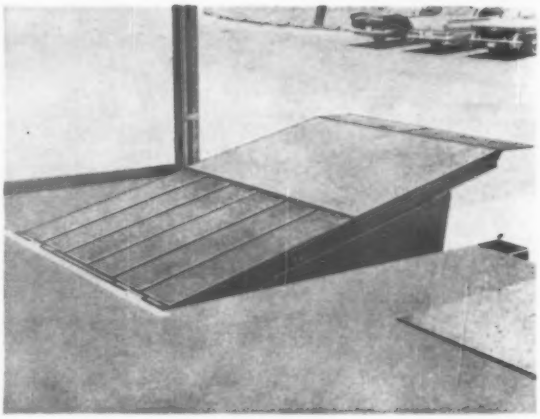
CLEVELAND TRAMRAIL
OVERHEAD MATERIALS HANDLING EQUIPMENT

For more about these items, circle numbers on Reader Service Card next to back cover.

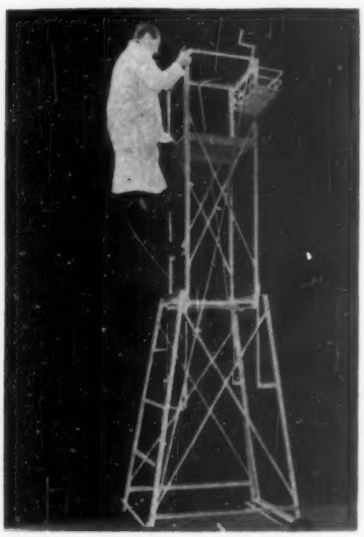
Meets trucks half-way

The trick is performed with a telescoping platform. Here's a "4-way" dock leveler that's different—not only does it raise and lower, but it also extends and retracts. This difference is enough to make loading and unloading in restricted areas much easier. What's more, it saves you space.

Trucks no longer need to back up flush to the platform. Retractable section of platform extends 20 in. and supports 10-ton load in this position. Four-push-button control hydraulically regulates "up," "down," "forward," or "reverse" operation. Comes with 6x8-ft. platform, and a one-piece or split lip. *Wayne Pump Co.* (Circle 88)



89—Drum dumper lifts (to 12 ft.) and positions 55-gal. drum of dry, wet, or liquid material. Automatic pushbutton controls raise and lower 1000 lb. at 10 fpm. Safety features include machine stop when button is released, and limit switches to prevent over-travel. *Colson Corp.*



90—Self-propelling platform adjusts from 4½ to 8½ ft. high. Moves forward or back when operator rotates handle on platform rail. Second handle guides steering. Galvanized "Move-on" needs little maintenance. Safety brake prevents creepage. *Anderson-Clyde, Inc.*

91—Automatic floor scrubber, battery-powered, eliminates cords; also fumes, odors. Does complete cleaning job from spreading solution to squeegee-drying floor. Rugged frame and case, large water capacity, brush pressure from 70 to 150 lb. *Lincoln Floor Machinery Co.*

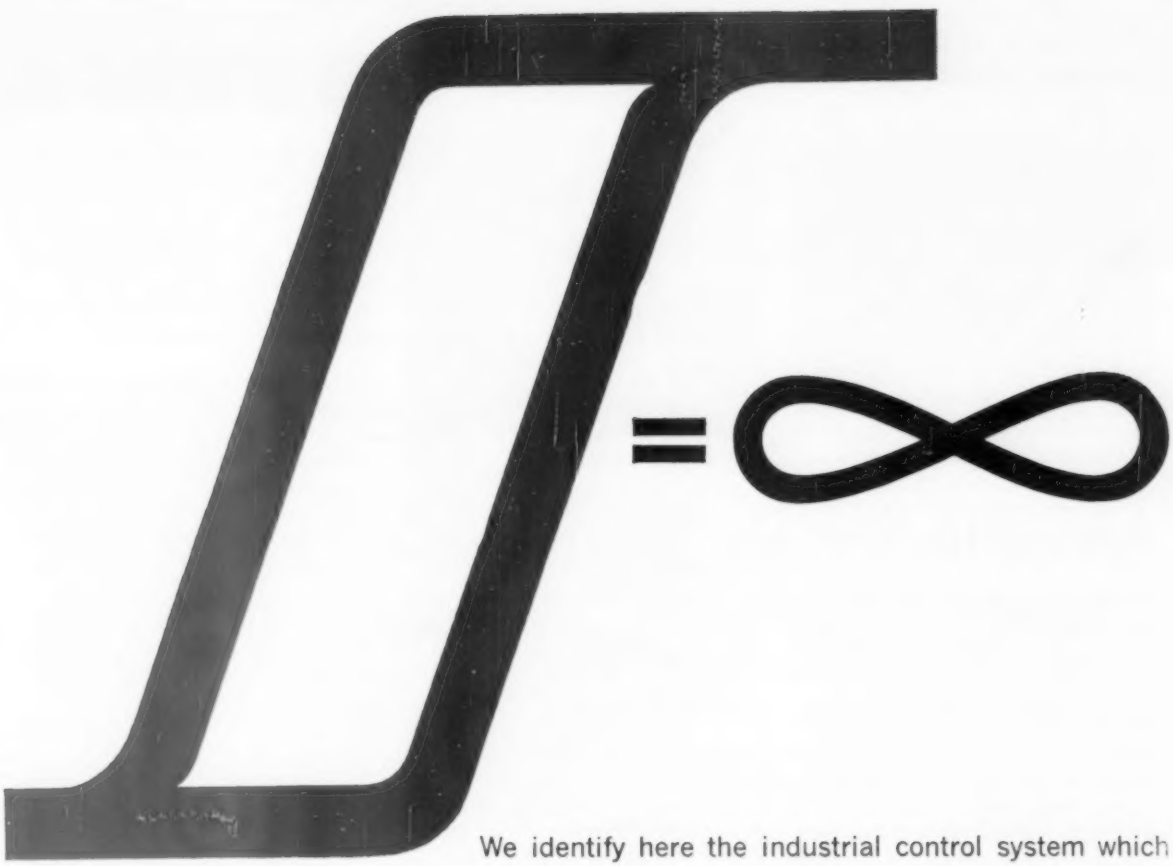
92—Linear measurement for controlling system monitors deviations of few thousands of inch from mechanical null. No specialized electrical engineering needed. Accurate to ±0.0002 in. Can be used as go/not-go gauge. Components available. *Assembly Products, Inc.*

93—Sortationer spots difference between various aluminum, magnesium, and copper alloys. Shows damage to overheated alloys; acts as go/not-go gauge for heat treating. Separates pure aluminum and magnesium from alloys. *Schueler & Co.*

94—Noise mufflers come in five series to curb even the loudest and most irritating noises including jet engines, blowers, compressors, air and gas blow-off valves. For low, medium, and high velocity discharge, also for pulsating gas flows. *Industrial Acoustics Co.*

95—Portable ladder tester applies thrust (to 600 lb.) to ladder rungs, and records results on direct-reading gauge. Determines exact breaking point of defective rung before accident occurs. Tests cable, wire rope, and chain tensile strength. *Hydraulic Systems, Inc.*

Turn the page

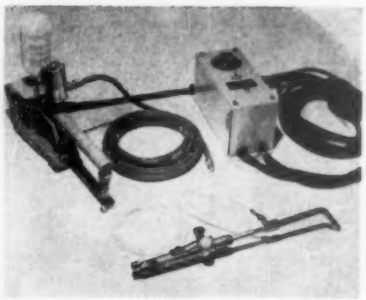


We identify here the industrial control system which will operate through an endless number of cycles without need for human direction, maintenance or servicing. The symbol for infinity in the equation shown above is obvious. The other symbol, the hysteresis loop defines the system as *magnetic* static control. The word "static" is used because there are no moving parts. Thus, under normal operating conditions the system never wears out. Customers have come to us for magnetic static control systems which are in use today from the automated lines of New England textile mills to automobile assembly lines in Detroit to the steel mills of the Argentine. If you, like they, wish to learn what operational statistics and costs *could* be by using magnetic static control for long life and dependability, will you please write us? Magnetics Inc., Dept. F-83, Butler, Pennsylvania.

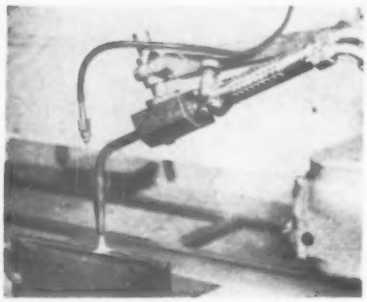
INDUSTRIAL CONTROL EQUIPMENT

MAGNETICS inc.

J-0738



STANDARD WELDING OUTFIT . . .



WITH MODIFIED TIP . . .

Sprays, fuses in one operation

Hardfacing and brazing done at minimum expense and with optimum results. These are only two of the advantages of this Aircospray metal-to-metal surfacing process. For the first time, a system is available that sprays and fuses powdered metals to base metal simultaneously.

It's done with a standard oxyacetylene welding outfit and a modified two-channel torch tip. Through this special tip, any powdered alloy is laid down at the same time as flame heats metal being sprayed. Photo at top right shows torch spraying and fusing on edge of 1/16-in. steel plate. Flow of powder is controlled by solenoid at arm's reach of operator. This controlled flow permits laying down smooth-finished surface with deposition as thin as 0.003 in. This surface minimizes grinding needed to bring product down to size. There's no caking or turbulence, and little waste from overlaying with controlled flow.

Carrier gas (argon, helium, nitrogen, carbon dioxide) flows at low 5 to 8 cfh. to inhibit caking.

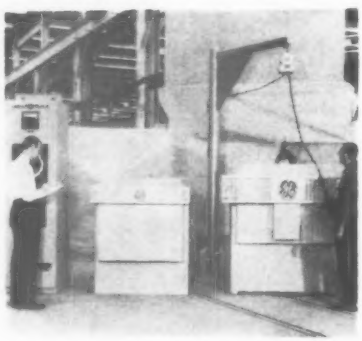
Applications: overlaying of hardfacing material on automotive and gate valves, plowshares, saw blade guides and disks; brazing with bronze and silver alloys. Tips come in three styles, 15 models. *Air Reduction Co.* (Circle 96)

Heats metals in less than half the time

Convection and radiation furnaces run a poor second aaginst this new heat transfer process. It slashes 85% off metal heating time and produces uniform temperatures. Higher production capacities and lower costs are the result.

The process, based on the "fluidized bed" principle, heats parts in dense dispersion of hot, highly turbulent solid particles that are suspended in a controlled stream of atmosphere such as air. These fluidized particles have virtually the same physical and thermal properties that true liquid has.

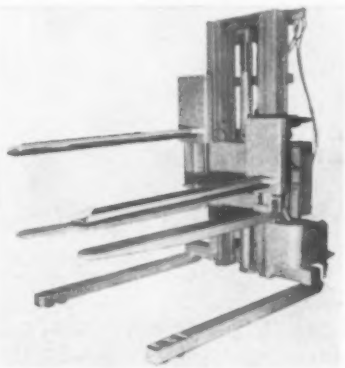
Heat transfer coefficient is 70 to 130 Btu./hr. per sq. ft. per degree F. This medium, because of high heat transfer coefficient, also provides intermediate quenching rates.



Process can be used to anneal, normalize, solutionize, age, harden, and for isothermal transforming. Comes in line of batch furnaces for heating beds, quenching beds, and work-handling equipment. *General Electric Co.* (Circle 97)

98—Valveless water filter automatically performs gravity-fed backwash operation without pumps, gauges, valves, manual or electrical controls. Sets off cycle at exact moment without outside activation. No over- or under-wash, no back-up of rinse water. *Permutit Co.*

99—Air tool cleaner/oiler is double-compartment cylinder containing cleaning solvent and lubricating oil. Portable (30 lb.), for cleaning permanently mounted bin air vibrators, bearings, oilers, etc., in the field. No need to disassemble tools. *C. J. Breitenstein Co.*



100—Fork lift has individually operated overhead arms to handle loads of varying heights. Arms have 1-in. rubber on bottom to clamp loads without damage. Straddle-type JackStacker permits carrying loads of two heights with one piece of equipment. *Lewis-Shepard Products.*

101—Mobile drum elevator picks up by straddling horizontal or vertical drum and raising to 48 in. for tiering two high. To dump, clamped-in drum is rotated with hand wheel. Mechanical grab comes in two types. Optional interchangeable platform plates. *Revolvator Co.*

102—Portable load tester plugs into presses or dies during operating cycle to check maximum load. Safeguards against overload damage. Miniature electronic components achieve compact, accurate unit. Tests its own calibration and battery. *Niagara Machine & Tool Works.*

Turn the page

Storage Problems?

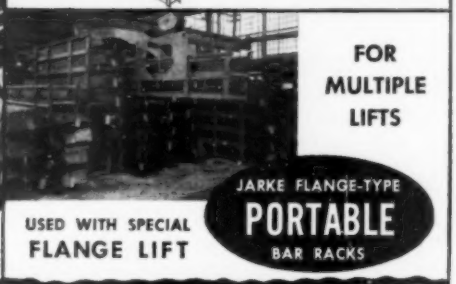
SOLVE THEM QUICKLY WITH

JARKE

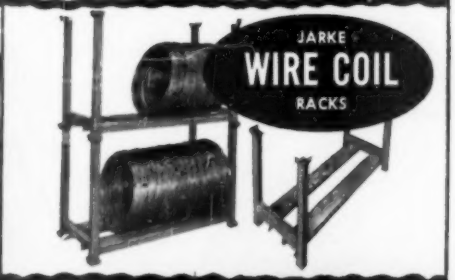
MODULAR STORAGE SYSTEMS

BARS
RODS
TUBULAR
PIPE
STRIP
STRUCTURALS

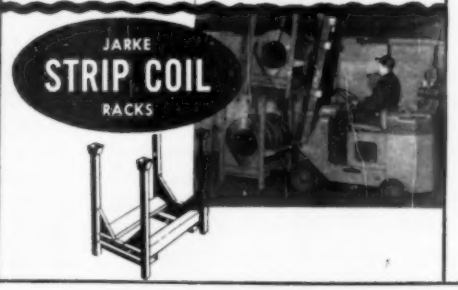
NO BOLTS . . . NO TOOLS . . . NO FITTINGS . . . SET UP OR TAKE DOWN QUICKLY BY ONE MAN
SPECIAL NESTING CAPS
PREFABRICATED
MINI-MODULE®
STORAGE RACKS



WIRE
COILS



STRIP
COILS

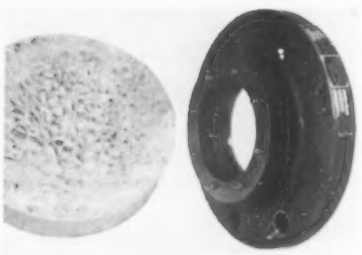


From small odd-shaped pieces to large heavy bar-stock, there is a Jarke Modular Storage System that will definitely provide you with the safest, most modern storage method in existence today. With a Jarke System, you'll store MORE in LESS space at LOWEST cost. Ask us to send a trained Jarke field engineer . . . he will provide you with valuable assistance in planning an efficient and economical storage system tailored to your specific requirements. No obligation. Write Jarke Manufacturing Company, 6333 Howard Street, Chicago 48, Illinois.

An Orderly Plant
is a Profitable Plant

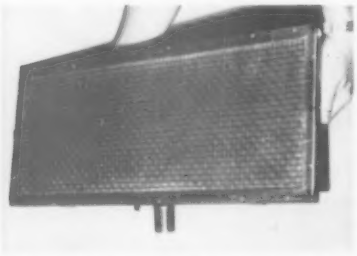
103—Backing ring quickly and easily aligns pipe for making quality welds when inside diameters are slightly out of round. Fits into beveled pipe end. Heat expands ring, forcing it tightly against inner pipe surface. Eliminates gaps, openings, etc. *Robvon Backing Ring Co.*

104—Intercom phone offers complete privacy; built-in mike frees hands. Dials by pushbutton. Soft tone and light signal incoming calls; picks up voice up to 25 ft. away. For two to 2000 stations. Also for remote control of plant operations. *International Magnefonics Corp.*



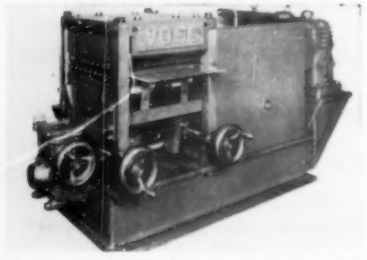
105—Sight glass, for viewing processing of liquids or vapors under high pressure (over 30,000 psi.) and heat, is shatter-proof. Special custom-made mount (right) holds lens, compressing it so pressures only fracture glass—no blowout. *PresSure Products Co.*

106—Plasma flame torch cuts through any metal about 4 in. thick, including tungsten, molybdenum, tantalum. Fits standard cutting carriages. Plasma velocities over 10,000 mph., temperatures over 50,000 F. permit cuts at high speeds with little slag. *Thermal Dynamics Corp.*

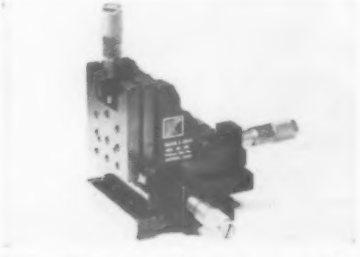


107—Heating panel gives controlled, flameless, low-temperature infra-red heat for baking, drying, bonding, etc. Converts LPG into infra-red heat energy on catalytically active metal screen. Produces from 2000 to 12,000 Btu./hr. per sq. ft. *Catalytic Combustion Corp.*

108—Dehydrator, for removing moisture-laden air from storage tanks, has desiccant in basket-like drawer (2 to 12 in.) with peep glass. Material turns white when saturated so maintenance men know when to replace. Lasts from 30 to 100 days. *Johnston & Jennings Co.*



109—Automatic flattener, for stamped parts, eliminates hand-straightening operations. Automatic or manual feeding. Achieves uniform output within 0.002 to 0.003 of dead flatness. Compact; handles many parts; adapts to those with uneven surfaces. *Voss Engineering Co.*



110—Work positioner provides smooth, accurate, fast positioning in three planes. Micrometer assures steady, measured movement to ½ in. Useful for work on semiconductors, electronic tubes, etc. Range: 0.500 in. in horizontal and vertical plane. *Kulicke & Soffa Mfg. Co.*

111—Submersible a-c motor has cast-iron motor frame and mounting base impervious to corrosion. Oil filled—protects against bearing wear; lifetime lubrication. In ½ to 40 hp., for polyphase connections; ¾ to 5 hp. for single-phase. *Reliance Electric & Engineering Co.*

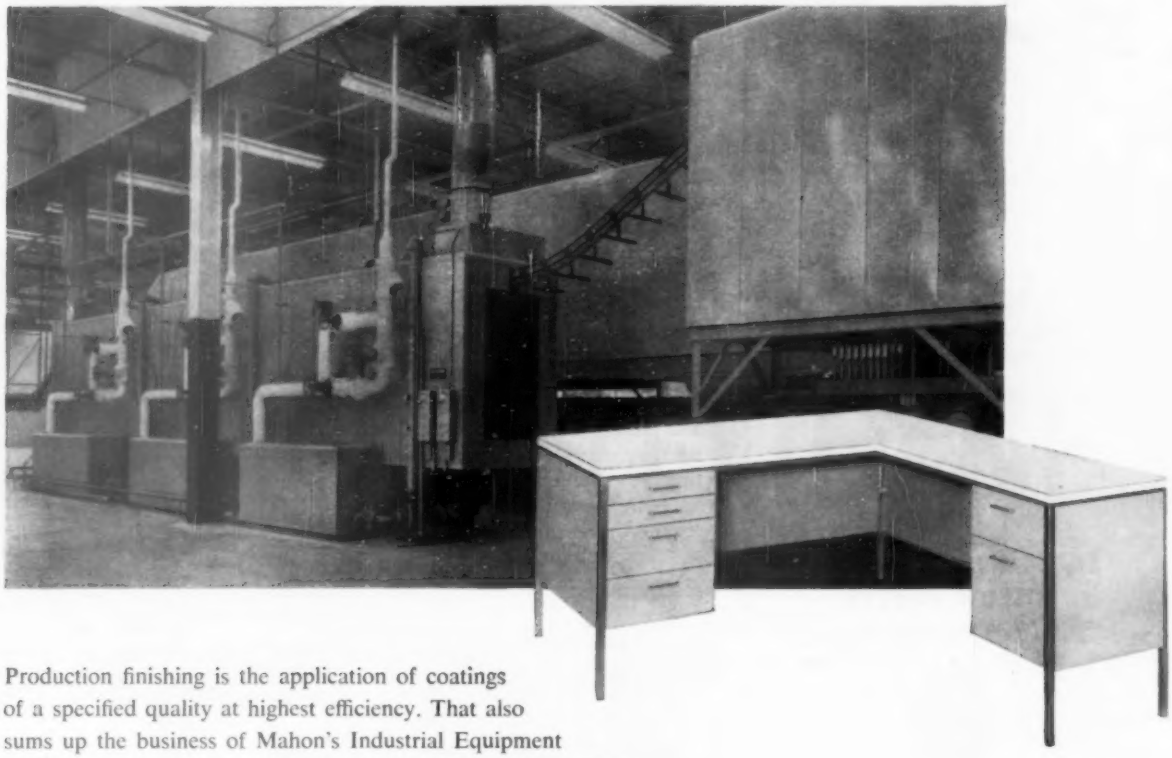
Turn the page

when management makes the **big** *decision . . .*

on finishing equipment —IT'S MAHON

Quality metal products deserve 'the finishing touch' of Mahon. Another example: fine office furniture from General Fireproofing.

Shown below: GF's new 1000 Series desk, part of a striking new, functionally designed line of business furniture. In background: A stage of the complete GF finishing system designed and built by Mahon.



Production finishing is the application of coatings of a specified quality at highest efficiency. That also sums up the business of Mahon's Industrial Equipment Division and they have learned it well . . . for over forty years . . . in hundreds of installations . . . for all types of finishing. Mahon metal-cleaning and metal-finishing systems will prove your best investment regardless of initial cost. In this highly specialized, multi-process area, can you afford less than the best for your quality products? Find out how Mahon's 'finishing touch' can improve your products . . . your costs . . . your sales. Call in Mahon.

THE R. C. MAHON COMPANY *DETROIT 34, MICHIGAN*

MANUFACTURING PLANTS—Detroit, Michigan and Torrance, California
SALES-ENGINEERING OFFICES—Detroit, New York, Chicago, San Francisco and Torrance.

MAHON COMPANY **industrial equipment**

- Complete Finishing Systems
- Metal Cleaning Equipment
- Painting Equipment for Spray, Dip and Flow-Coating
- Drying and Processing Ovens
- Special Plant and Production Equipment

MAHON COMPANY **building products**

- Aluminum or Steel Curtain Wall
- Rolling Steel Doors
- Steel Roof Deck
- Long-Span M-Deck
- M-Floors (Cellular Sub-Floors)

MAHON COMPANY **fabrication services**

- Structural Steel-Fabrication and Erection
- Steel Fabrication-Weldments
- Assembly and Machining
- Geodesic Domes—Fabrication and Erection

Your biggest value is in Mahon's planning and engineering experience

MAHON

For more facts Circle 416 on Reader Service Card

TORQUE-ARM

America's most widely used shaft mounted speed reducers!

SC, SCM BALL BEARING PILLOW BLOCKS

Quality, for normal and medium duty!

TAPER-LOCK CHAIN COUPLINGS

No reboring — no waiting!

•

Write for Bulletins!

- Torque-Arm—55 models—complete data.
- Bearings — Ball and Roller.
- Chain Couplings and Sprockets.

DODGE MANUFACTURING CORPORATION
400 Union Street • Mishawaka, Indiana

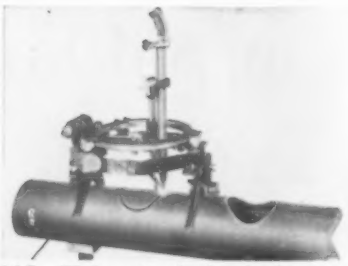
DODGE
of Mishawaka, Ind.

For more about these items, circle numbers on Reader Service Card next to back cover.

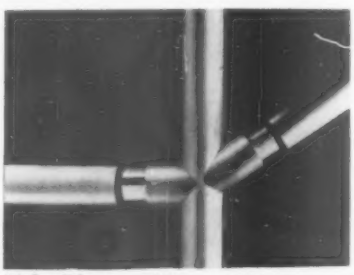
112—Portable impact drill makes fast, accurate 3/16- to 4-in. diameter openings in all masonry and reinforced concrete. Cuts steel reinforcing rods embedded in concrete without deflection. No chipping, cracking or breaking out when close to edge. *Stanley Electric Tools.*

113—No-motion detector protects machines, equipment, and processes against damage from stoppages. Can be used to control motor circuit or to operate warning device such as signal light, horn or bell. Connects by chain drive directly to motor-drive shaft. *Fuller Co.*

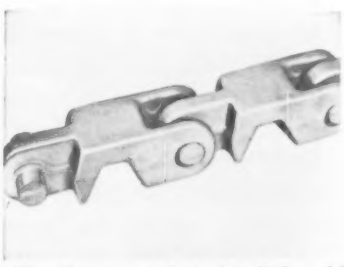
114—Bearing cleaner uses combination of pressurized solvent and air blasts to disintegrate and remove old lubricant and dirt particles in 30 sec. Now you can reclaim dirty, used ball and roller bearings for reuse. Handles all types from ¼- to 7-in. OD. *Bearing Inspection, Inc.*



115—Hole cutter is simple, low-cost machine for cutting 90-deg. holes (to 18-in. diameter) in pipe, tanks, flat plate. Uses no cams, patterns, or layouts. Electric or hand-operated. Cuts with oxygen and acetylene torch. Leaves edges clean, burr-free. *Steffan Mfg. Corp.*



116—Pipe railing system uses wrought aluminum fittings for fast, easy assembly without welds or exposed fasteners. Components for Schedule 10 1¼- and 1½-in. pipe include tees, elbows, floor flanges, connector sleeves, brackets, wall returns, plugs. *Julius Blum & Co.*

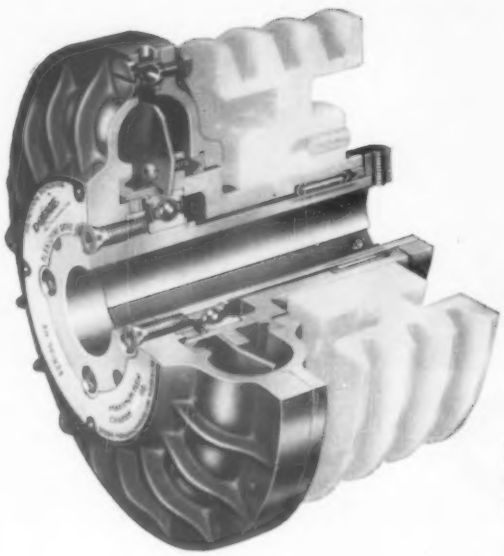


117—Conveyor chain has links with forged pin instead of conventional removable pin. High strength thus achieved gives chain substantially longer life. Master link connects length of chain (to 50 ft.). In case of break, master link is replacement. *Kropp Forge Co.*

Turn the page

WHAT'S YOUR PROBLEM?...

- ☑ Overheated motors?
- ☑ Excessive belt maintenance?
- ☑ Breakage of materials being processed —like thread, wire, paper?
- ☑ Expense of oversize or high torque motors?
- ☑ High demand rate?
- ☑ Expense of reduced voltage starters?
- ☑ Clutch trouble?
- ☑ Breakage of transmission parts due to instantaneous shock loads?
- ☑ Damage and recurring down-time from overloads?



FLEXIDYNE

THE DRY FLUID DRIVE

It is no longer necessary to accept the destructiveness—the costliness—of conventional starting in the mechanical transmission of power. Flexidyne changes that!

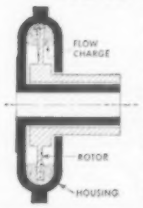
Flexidyne is the new way to start loads *smoothly*—to protect against shock and overload—to save power—all *without any sacrifice of efficiency at full load!*

This revolutionary development is ushering in "the day of the soft start"—which can mean thousands of dollars to you in equipment savings and in better, more economical operation.

Flexidyne is available, off the shelf, in Drives and Couplings. Capacities range from fractional to 1,000 hp. Ask your local Dodge Distributor or write us for technical bulletin.

DODGE MANUFACTURING CORPORATION, 400 Union St., Mishawaka, Ind.

HOW FLEXIDYNE WORKS



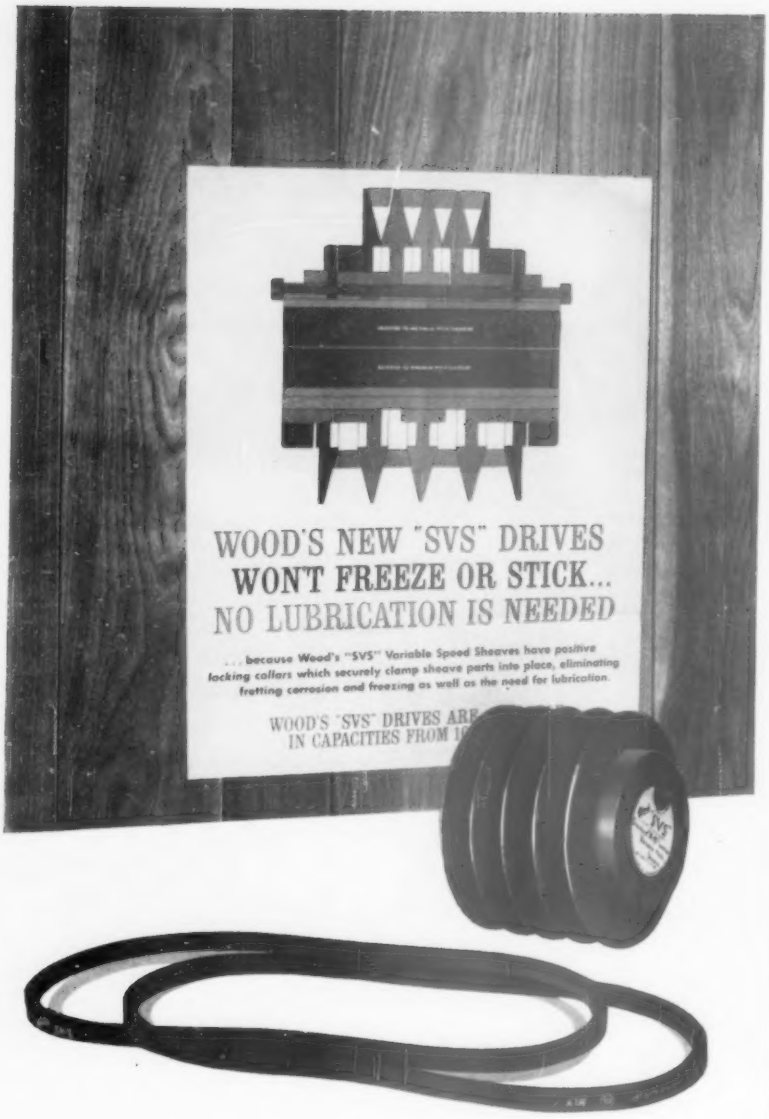
The "dry fluid" in Flexidyne is tiny heat-treated steel shot. A measured amount, called the "flow charge," is contained in the housing, which is keyed to the motor shaft. Inside the housing is a rotor, free to revolve relative to the housing, but connected to the load.

When the motor is started, centrifugal force throws the flow charge to the perimeter of the housing, packing it between the housing and the rotor, which transmits power to the load. Initial slippage is momentary. Housing and rotor become locked together and achieve full load speed without slip and at 100% efficiency.

CALL THE TRANSMISSIONEER—your local Dodge Distributor. Factory trained by Dodge, he can give you valuable help on new, cost-saving methods. Look under "Dodge Transmissioneer" in the *white* pages of your telephone directory, or in the yellow pages under "Power Transmission Machinery."

DODGE

of Mishawaka, Ind.


WOOD'S NEW "SVS" DRIVES
WON'T FREEZE OR STICK...
NO LUBRICATION IS NEEDED
. . . because Wood's "SVS" Variable Speed Sheaves have positive locking collars which securely clamp sheave parts into place, eliminating fretting corrosion and freezing as well as the need for lubrication.

Wood's stationary control, variable speed drives, including SVS types, are available in capacities from fractional to over 300 hp using conventional v-belts. Wide range VPS types are available in capacities from 1 to 20 hp.

Write for BULLETIN 6102.

Woods

T. B. WOOD'S SONS COMPANY · CHAMBERSBURG, PENNSYLVANIA

ATLANTA · CAMBRIDGE · CHICAGO · CLEVELAND · DALLAS

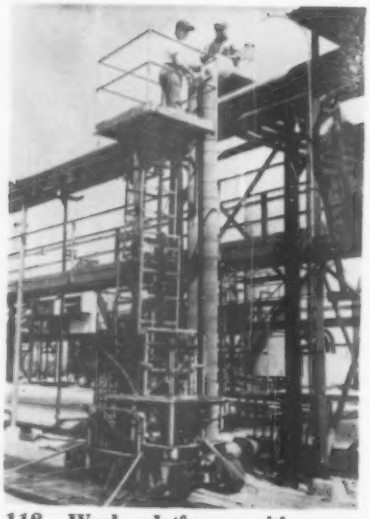
SVS/2361

For more facts Circle 419 on Reader Service Card

FACTORY/EQUIPMENT NEWS

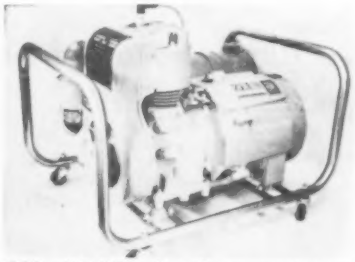
Begins on page 84

For more about these items, circle item numbers on Reader Service Card next to back cover.



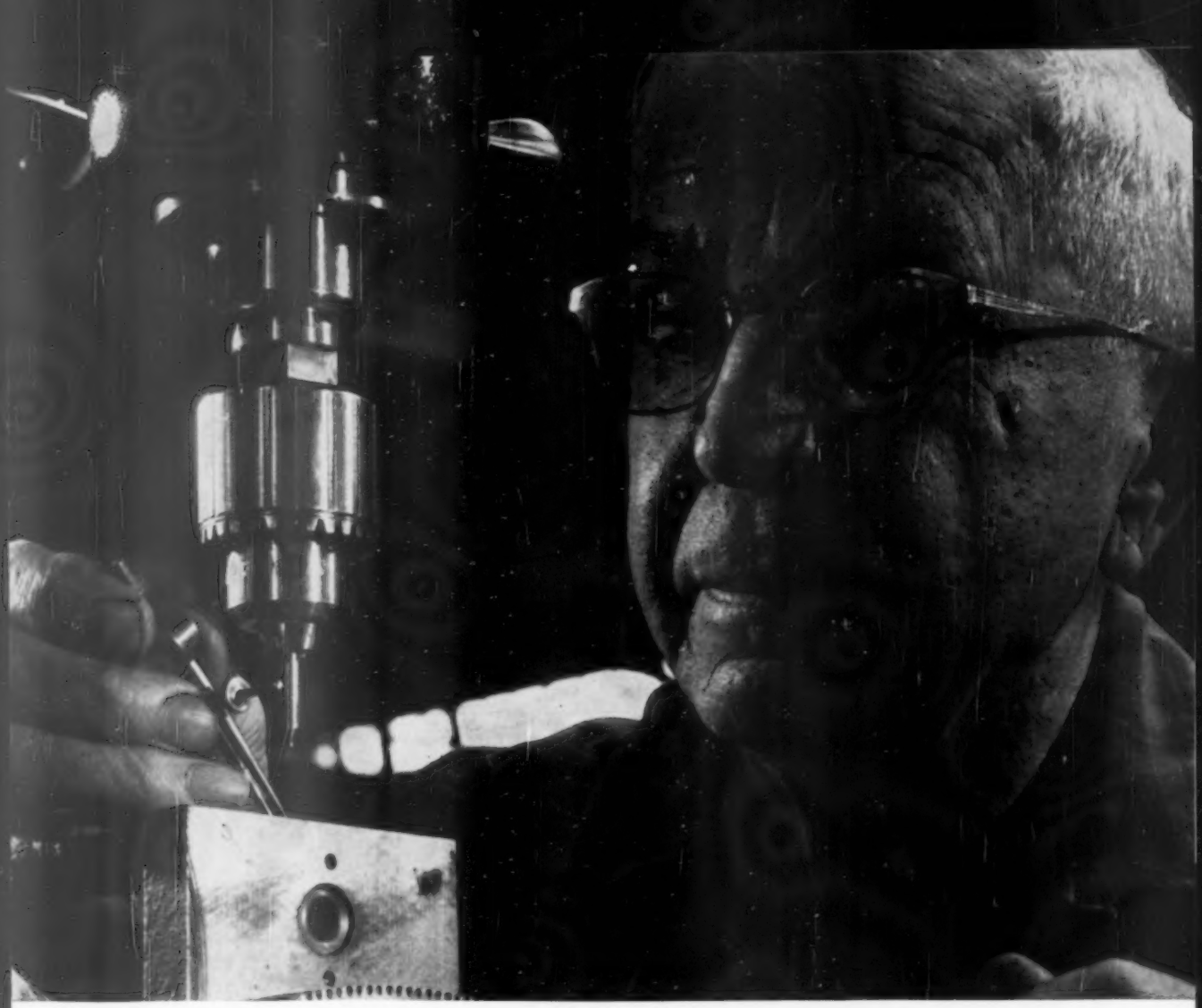
118—Work platform, with pneumatic tires, telescopes from 6 ft. 8 in. to 40 ft. Electric or hand-operated, it is designed primarily for outdoor service. Built-in leveling screws stabilize it on uneven surface. Auto-steer towbar simplifies moving. *Economy Engineering Co.*

119—Coupler has extra O-ring that prevents spray, when connecting or disconnecting, caused by internal pressure on one side of coupling. For pressure or vacuum systems. Two types, with or without valved nipple and coupler, single or double shut-off. *Snap-Tite, Inc.*



120—Mobile electric generator uses permanent magnet rotating field to produce 3000 watts, continuous duty, at 115 or 230 v. No brushes, slip rings, commutator, belt. Fuel tank of 2¾ gal. operates unit about 5 hr. full load. Adapts to butane, propane gas. *Borg-Warner Corp.*

Turn the page



At Esterline-Angus, the past becomes the future

● Our experience of over 50 years . . . the skill of our master craftsmen . . . complement perfectly the new forward-looking, creative work of our engineering staff. The result? Modern graphic recording instruments unequaled in design as well as workmanship and material.

We're continuously developing new instrument designs and applications. All are carefully built and tested to assure trouble-free performance under even the most severe operating conditions. That's why Esterline-Angus recording instruments offer you the highest reliability rating in the industry. Many of our very first instruments are *still* functioning accurately. Ten, twenty, thirty years of dependable operation are not unusual.

Insist on modern recording instruments by Esterline-Angus . . . where master craftsmen's skill is successfully teamed with space-age technology.

Write for case histories, "How to cut production costs, increase maintenance efficiency and aid research with Esterline-Angus Graphic Instruments." Address: THE ESTERLINE-ANGUS INSTRUMENT COMPANY, BOX 596B, Indianapolis 6, Indiana.

Finer graphic instruments for over 50 years—ESTERLINE-ANGUS

New NO-SPILL Bucket

for PAYLOADER® units

A strikerbar-spillguard blade, by hydraulic power, sweeps forward removing excess material. Blade remains forward in transport to retain load.

. . Eliminates spilling during transport
. . Saves costly floor and aisle clean-up
. . Eliminates re-working spilled material
. . Increases daily productive capacity
. . Delivers uniform loads for "batching"

The "No-Spill" bucket is the latest of many PAYLOADER *firsts*, and makes the tractor-shovel a cleaner, more productive and more efficient materials mover than ever before. Its two features — the striking-off of excess material while loading, and preventing any loss of load while transporting — give many on-the-job savings and benefits:

1. Permits higher transport speeds for more trips and more production.
2. Delivers bigger loads as none is lost in transit.
3. Eliminates the dust nuisance caused by light, dry materials spilling in transit.
4. Prevents the accumulation and build-up of spillage along aisles — saves the cost and time of digging up and reprocessing such spillage.
5. Eliminates the contamination and waste involved when different materials are spilled on the same routes.

Three popular PAYLOADER sizes can be supplied with "No-Spill" buckets — the Models HA, H-25 and HAH. Your Hough Distributor will be happy to show you what they can do to improve materials moving efficiency on your operations. See him today.

HOUGH®

THE FRANK G. HOUGH CO.
755 Sunnyside Ave.
LIBERTYVILLE, ILLINOIS
SUBSIDIARY — INTERNATIONAL HARVESTER COMPANY

☐ Send data on No-Spill bucket

☐ Send data on other rubber-tired "PAYLOADER" models

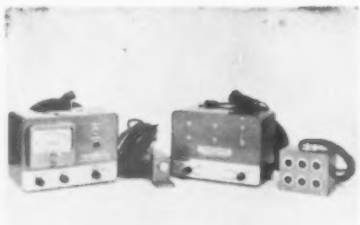
Name _____
Title _____
Company _____
Street _____
City _____
State _____

1-A-2

FACTORY/EQUIPMENT NEWS

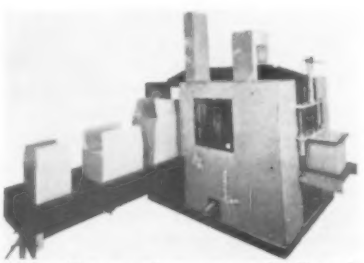
Begins on page 84

For more about these items, circle item numbers on Reader Service Card next to back cover.



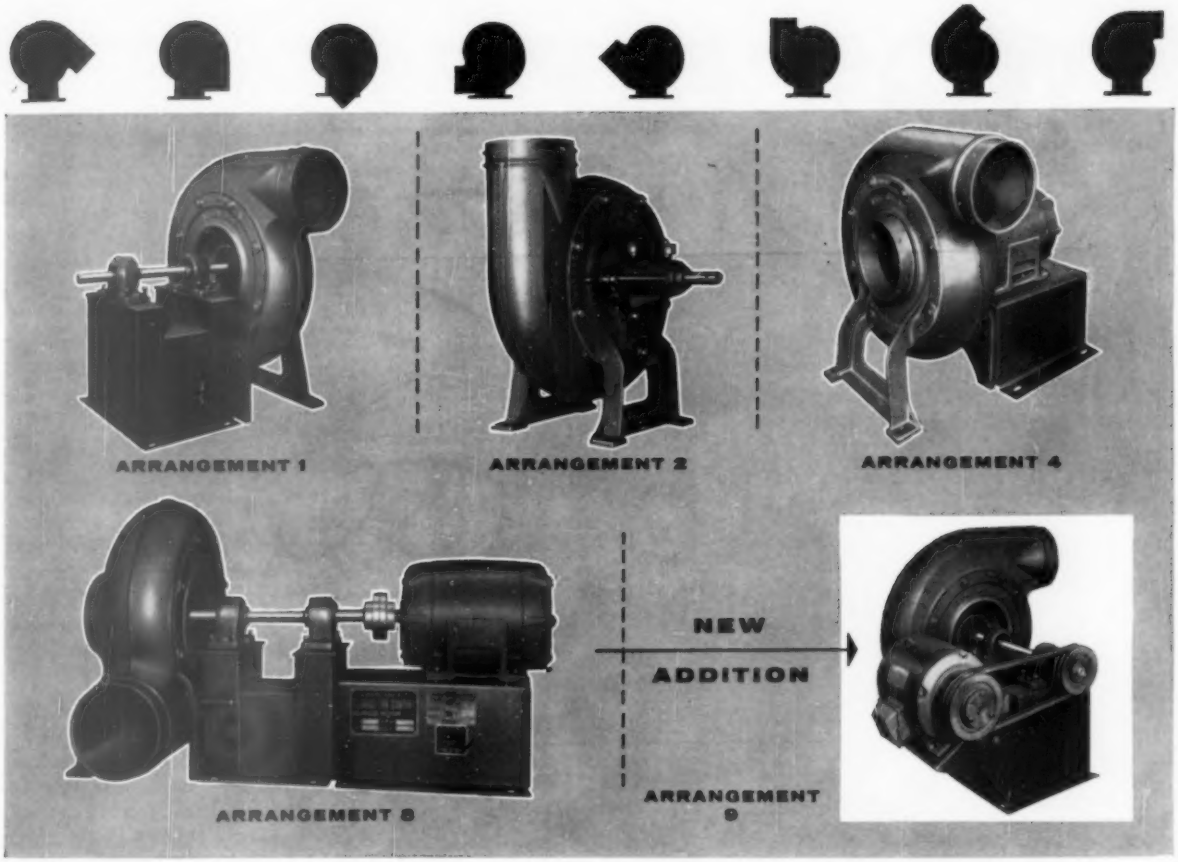
121—Vibration monitor electronically signals or stops machine when vibration exceeds pre-set limits. Plug-in attachment converts it to portable balancer for correcting vibration conditions. Sensitive to amplitude of two-millionths of an inch. *Stewart-Warner Corp.*

122—Multiple positioning control automatically places machine tools, valves, hopper gates, etc., at any of several pre-set spots. Position-selector control box can be remotely located. Pre-set stops are changed by loosening screws on limit switch. *Hanna Engineering Works.*



123—Case sealer automatically adjusts itself to close corrugated containers of varying sizes. Handles 12 cartons per min. Uses thermo-plastic sealant which sets in three seconds. Compact, needs about 5x7-ft. floor space. Conveyor-fed. *Union Bag-Camp Paper Corp.*

Turn the page



Presenting... *the new line of CLARAGE Type CI Exhausters*

Volumes to 3800 CFM, pressures to 18″, temperatures to 750°F., six sizes, three wheel types, five arrangements as shown above, adjustable to any of the eight standard air discharge directions.

Result: fan equipment uniquely well suited to nearly every service imaginable. The uncomplicated, heavy construction, featuring cast iron housings and sideplates, makes the Type CI the natural selection for such severe applications as exhausting from grinding, woodworking, and other machines . . . conveying materials ranging from fibers to grains . . . removing smoke and fumes . . . furnishing industrial process air . . . handling chemical and hot gases.

Write for new Catalog 707 containing performance tables, dimensions, and system data. Get acquainted with the advantages you'll enjoy by choosing Clarage Type CI Fans for your next requirements. CLARAGE FAN COMPANY, Kalamazoo, Michigan.

Dependable equipment for making air your servant

CLARAGE FAN COMPANY

Kalamazoo, Michigan

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

The nearsighted MISTER MAGOO says... "1954? A significant year for the Magoo exchequer. I cannily invested in a galaxy of uranium stocks, and General Electric invented the Quartz Infrared Lamp. Happy birthday, Quartz Infrared! Confound it—they put two fuses on these new-fangled firecrackers and neither one works!"

INSTANT HEAT!

G-E tubular Quartz Infra-red Lamp hits 4,000°F. in less than a second

...and two seconds after you turn off this pencil-thin lamp, 80% of its radiant energy is gone. Residual heat won't overheat your product.

Pour a glass of ice water over this lamp at full heat and—nothing happens! The quartz tube withstands violent temperature shock.

General Electric's tubular Quartz Infrared Lamps are made for jobs where high or low amounts of concentrated radiation are needed *fast*. Examples: cooking food; shaping plastics; drying paints, paper, inks and glue; heating people; testing aircraft at supersonic-flight temperatures.

In most cases, you'll be surprised how few lamps do the trick. You can produce concentrations of 10 to more than 10,000 watts per square foot. It's the most powerful infrared source of its size. Quartz Infrared Lamps are simply constructed with a flexible wire at each end and can be installed economically. They've been proved in actual use for over six years.

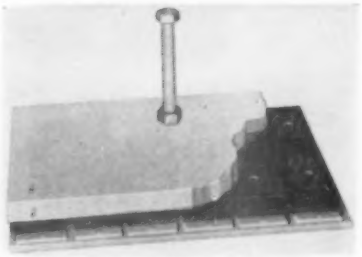
Choose the size you need—500 to 5000 watts—in 5″ to 50″ lengths at 100 watts per inch. Ask your General Electric lamp representative for information on how Quartz Infrared Lamps can help your operation. General Electric Co., Large Lamp Dept. C-11, Nela Park, Cleveland 12, Ohio.

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts Circle 423 on Reader Service Card

For more about these items, circle item numbers on Reader Service Card next to back cover.



124—Machine mount isolates shock and vibration on very heavy equipment weighing up to 64 tons per mount. Neoprene is the cushioning agent; available in various stiffnesses to meet individual needs. Twelve sizes cover loads from 16,000 to 128,000 lb. *Barry Wright Corp.*

125—Air compressor is ceiling-mounted with specially designed suspension system to save floor space. Two-stage unit, with 9.5- or 14.0-cfm. displacement, comes with a single- or 3-phase motor, 80-gal. tank. Spring suspension achieves smooth, quiet operation at all times. *Wayne Pump Co.*

126—Variable speed drive provides infinitely variable output speeds from 10 to 100% rpm. motor. Produces very high torque at low speed. Control wheel regulates output shaft speed. Drip-proof or TEFC, in ½ to 1 hp., 1200 and 1800 rpm. models. *Lima Electric Motor Co.*

Turn the page

NARROW MINDED

RAYMOND®
Narrow Aisle Trucks

RAYMOND Trucks are narrow minded where aisle widths are concerned. The truck we've illustrated, for instance, is tiering in an aisle just 6½ feet wide. Yet there's ample room to pick up or deposit loads in racks extending 20 feet high. A counterbalanced truck, by contrast, would have required an aisle 4 to 6 feet wider . . . wasting valuable floor space and sacrificing storage capacity.
Write for a copy of our latest catalog, "RAYMOND Narrow Aisle Handling Equipment". It contains ideas that may suggest substantial dollar and space-savings for your operation.

RAYMOND®
The originator and largest builder of narrow aisle trucks

Lease-Rental Plans Available for all RAYMOND Equipment.

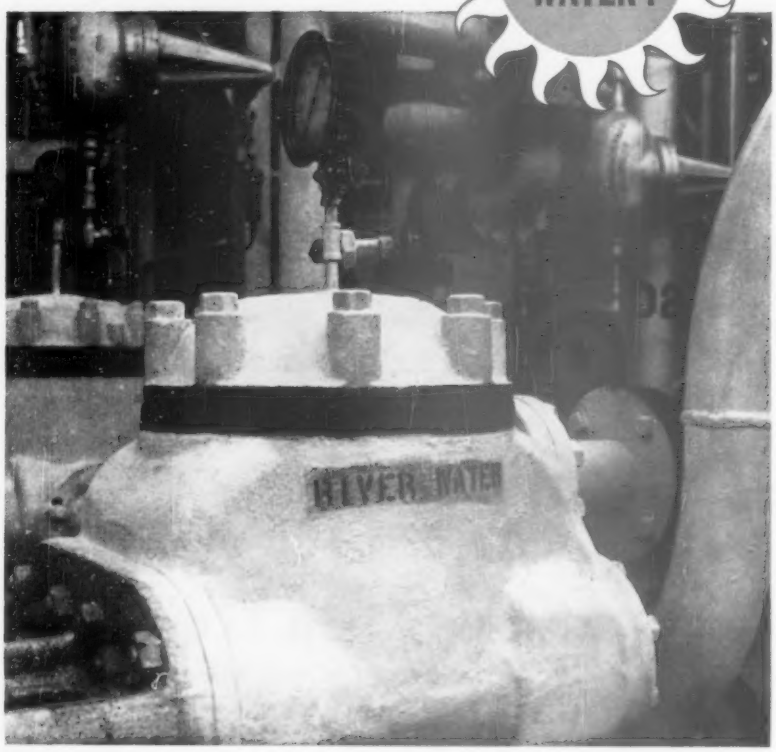
The RAYMOND CORPORATION
3223 Madison St., Greene, New York
Please send "RAYMOND Narrow Aisle Handling Equipment"

NAME _____ TITLE _____
COMPANY _____
STREET _____
CITY _____ STATE _____

For more facts Circle 424 on Reader Service Card

LOUISIANA

where Industrial Climate means WATER!



Water in year-round abundance—millions of tons of it—is available in Louisiana to quench the growing thirst of industry. More than 7,000 square miles of the state's area consists of streams and lakes. Annual rainfall exceeds 45 inches statewide. The mighty Mississippi discharges an average of 415,000 cubic feet of water per second into the Gulf. Big, steady-flowing wells in Louisiana yield some of the purest water anywhere. *Low-cost water is available to industry NOW . . .* unrationed supplies for municipal and agricultural consumers are adequate in every season. Constantly replenished fresh-water reserves are another reason why "In Louisiana, *Climate* is a lot more than just weather."

Every section of Louisiana has: SIZABLE COMMERCIAL CENTER/ABUNDANT FRESH WATER/ACCREDITED UNIVERSITY OR COLLEGES, GOOD SCHOOLS/TRADE SCHOOLS/GOOD TRANSPORTATION/LOW COST POWER AND FUELS

Write for new booklet, "Louisiana Invests in Industry." Other information available . . . each inquiry receives individualized handling.

LOUISIANA DEPARTMENT OF COMMERCE & INDUSTRY
SECOND FLOOR • BATON ROUGE 4, LOUISIANA

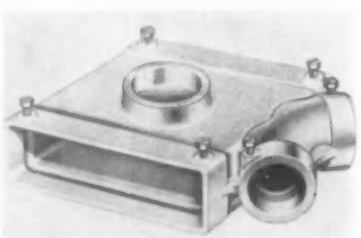
FACTORY/EQUIPMENT NEWS

Begins on page 84

For more about these items, circle item numbers on Reader Service Card next to back cover.

127—Low-pressure monitor automatically sets off whistle to warn when air pressure drops below preset level. Shuts off when proper pressure is restored. Useful for air chucks, clamping fixtures, dry sprinkler systems. Only 4½-in. long with ⅜-in. thread. *Roney, Inc.*

128—Computer, model 1410, is faster, has larger memory than IBM 1401. For complete manufacturing control system—from sales forecasting through production control to operations analysis. Makes up to 1,800,000 decisions per min. *International Business Machines Corp.*



129—Duct-to-conduit adapter, for underfloor raceway, provides lateral take-offs at 45-deg. angles. Replaces two right-angle fittings. Openings, 1¼ in. in diameter, permit entry of two conduits to duct or two feeds from duct to independent units. *Wheatland Electric Products Co.*

Turn the page

Puritan Representative (center) discusses Engineered Maintenance Program with G.E.'s Paul Huska (right) and Earle Holt, General Foreman Building and Equipment Maintenance.

Report from General Electric

"Puritan Engineered Maintenance gives us better organization and control of plant housekeeping"

Puritan representative surveyed G.E.'s plant—came up with tailor-made program.

Training of custodians is part of Puritan's Engineered Maintenance Program.

Regular inspections insure high standards of housekeeping at Pittsfield plant.

"Rapid expansion of facilities and constant construction made it almost impossible for us to maintain the high housekeeping standards our management desired", says Paul Huska, Foreman, Custodial Service, General Electric Ordnance Department, Pittsfield, Mass. "As part of our continuing efforts to upgrade the effectiveness of our service, we turned to Puritan for specialized advice."

"In conjunction with our own methods and standards people, Puritan experts helped us devise a complete and coordinated plant housekeeping program. In addition to organizing the work of each custodian, which, incidentally, boosted staff morale, the program provides for automatic control, inspection, and measurement review."

"The results have been gratifying. Total effectiveness has increased and is continuing to climb. Much of the credit must go to Puritan's knowledge, skill and ideas."

Perhaps you would achieve similar results with a Puritan Engineered Maintenance Program. As a user of Puritan Sanitary Maintenance Products, you get this service free.

Find out how it works. Send today for free booklet, ENGINEERED MAINTENANCE.

PURITAN CHEMICAL COMPANY

EXECUTIVE OFFICES: 916 ASHBY STREET, N.W. ATLANTA 18, GEORGIA
PLANTS AND WAREHOUSES: ATLANTA, GA. • HOUSTON, TEX. • ST. LOUIS, MO.

PURITAN CHEMICAL COMPANY
916 Ashby Street, N.W. • Atlanta 18, Georgia
Send me a free copy of your 16-page booklet, ENGINEERED MAINTENANCE.

NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

RUGGED REVOLVATOR LIFTS
are adapted to your needs

Since 1904 Revolvator has been building portable elevators and related lifting equipment. Portable elevators are available in any reasonable lift and platform size in capacities from 500 lbs. to 5,000 lbs. Lifting may be by cable or hydraulic, hand operated or electric, according to requirements. Variations of fixed or revolving base, telescopic masts and other accessories are available.

Portable cranes, barrel and carboy handling and dumping lifts and similar types of equipment are based on the same rugged Revolvator components and design as the basic portable elevator.

INDEX No. 11.17

Revolvator portable elevator. Electric powered telescopic mast type shown. Revolving bases and other features available.

INDEX No. 11.21

Uplifter with two speed hand hoist and dual capacity. Stock unit available in standard sizes.

INDEX No. 11.22

Uplifter with electric hydraulic hoist with two roller chains. Stock models available in two sizes and capacities.

INDEX No. 13.22

Revolvator manually moved, electric hydraulic hoist fork lift. Designed for later conversion to fully powered Go-Getter.

INDEX No. 11.31

Revolvator semi-portable hydraulic lift table. For sheet feeding, etc. Where conditions do not permit submerged pistons as with Index 12.21 models.

INDEX No. 31.10

Revolvator barrel dumper with either hand or electric hoist. Either front or side dumping models discharging at any reasonable level to suit requirements.

REVOLVATOR CO.

ESTABLISHED 1904

Designers and Manufacturers of Portable Elevators, Power and Hand Lift Trucks, Hydraulic and Traction Elevators, Carboy and Barrel Dumpers, Portable Cranes, Positioners, Storage Racks, Turntables and Other Material Handling Equipment.

8761 TONNELE AVENUE

NORTH BERGEN, NEW JERSEY

Sales Representatives in Leading Centers

For more facts Circle 427 on Reader Service Card

FACTORY/EQUIPMENT NEWS

Begins on page 84

For more about these items, circle item numbers on Reader Service Card next to back cover.

130—Motor control center uses lock-out, tilt-out pans and other improvements for fast, simple access to starters. Ratings from 600 to 1600 amp., 110 to 600 v. Horizontal buswork can be installed at top or bottom. Main bus handles 50,000 amp. *Allis-Chalmers Mfg. Co.*

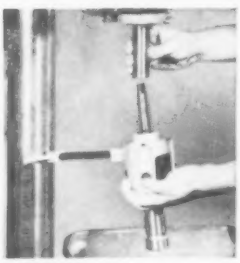
131—Continuity tester and spotlight, in belt-carrying case, checks wiring, controls, circuits, fuses, grounds, switches, burglar alarm systems, etc. Operates on 3-v. supply. Case holds flashlight and tools. Two in series test wiring to 5000 ft. *Bright Star Industries.*

132—Air dryer, for pneumatically fed equipment such as air-conditioning and ventilating systems, has rated capacity of 10 scfm. at 100 psig. Works by mechanical refrigeration—no cooling water, no ambient temperature variance problems. Floor or wall mounted. *Hankison Corp.*

Turn the page

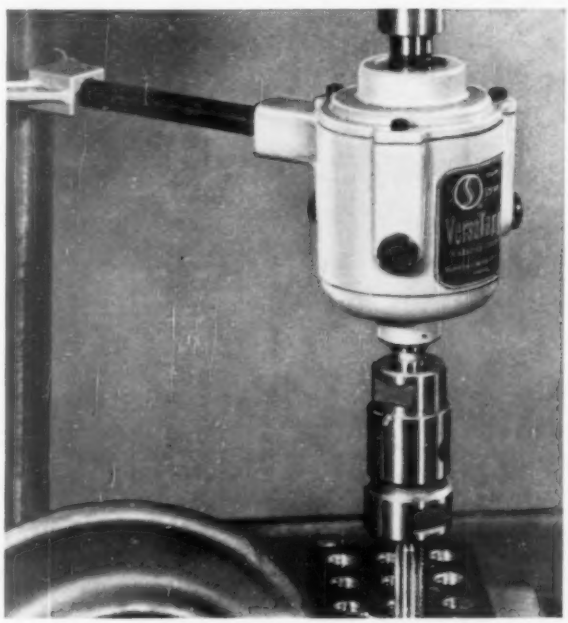
IT'S A FACT!

You can tap 1/2" holes with a light drill press and Supreme's New VersaTAPPER®



Shaft of Model 6100 is held in drill press chuck. No. 6200 (above) has Tapered spindle.

Supreme Accutap Chuck is standard equipment with VersaTAPPER. Capacity 0-½"



VersaTAPPER is a compact precision-made tapping unit. Fits any drill press . . . features 0 to ½" capacity range plus 4-time increase in torque. Easy to install. Simple and quick to remove after use.

VersaTAPPER...
operates easily in any material
...with widest capacity range
...yet costs far less

JUST $63 COMPLETE

The *new* VersaTAPPER has scored an instant success with production people everywhere. It has more versatility than other tapping devices. It has the *widest capacity range*—from 0 to ½". It develops *more power*—makes the tapping of ½"-13 holes a simpler matter, even with light duty drill presses. VersaTAPPER is *simple to use*—can be successfully operated by anyone in your shop.

All of these features at the remarkably low price of $63 complete marks VersaTAPPER as a product you must see at the first opportunity. It's available at your local Supreme Chuck distributor. Call him soon. Also check number on the reply card in this magazine for literature.

Supreme
PRODUCTS CORPORATION
2222 S. CALUMET AVENUE • CHICAGO 16, ILLINOIS

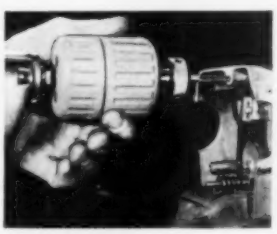
You get more from power tools with Top Quality Supreme Accessories

Supreme Brand Chucks

Noted for unmatched quality. The widest range of sizes and types...one for every machine in your shop. Exclusive Supreme hardening means greater accuracy—longer wear.

Supreme Versamatic

Reversible speed reducer for portable drills. Fits all makes —permits their use for power screw driving, nut running and heavy duty drilling. 7 to 1 reduction means high torque increase. *A fine tool.*



Supreme Push-Pull Tapper

Like the Versamatic, but made for the single purpose of tapping with portable drills. Reverses instantly for tap removal. Handles taps up to 5/16" diameter. Top quality. Simple to operate.

SUPREME PRODUCTS ARE IN STOCK IN YOUR CITY.
CALL YOUR DISTRIBUTOR

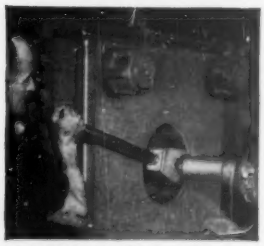
PRECISION ASR PRODUCTS

For more facts Circle 428 on Reader Service Card

the SWENCH®

LOOSENS TOUGH NUTS THAT EVEN POWER TOOLS CAN'T BUDGE

WHEEL LUGS on buses and trucks usually require the "beef" and skinned knuckles of two men to loosen. SWENCH does the job faster at less cost.



FROZEN HEX NUT on this molding machine caused 36 hours down time when removed by ordinary methods. Just 7 SWENCH impacts moved this tough baby.

RAILROAD HOPPER DOORS easily rust shut. Often it takes a 4-man crew a full day to loosen them. One man and a SWENCH does the job in just 7 or 8 impacts.

Discard that old-fashioned sledge. Put your torch away. Think before you buy another power wrench. Here's a *manual* wrench that delivers more effective torque than any other tool its size.

HOW?

Power wrenches deliver their torque as many tap-like blows. Ordinary hand wrenches apply a steady torque. Swench, on the other hand, builds up power in its super-strong spring for a mighty wallop, which is released as torsional impact every time the handle is advanced slightly more than 30 degrees. Swench multiplies torque applied to the handle more than 15 times.

Now one man can "Swench off"—in minutes—nuts that used to take a full crew a working day to burn or sledge off.

Swench is completely portable. No power connections needed. No auxiliary equipment to man and maintain. You save on man-hours. You save on maintenance. You save on initial cost. (Swench costs *much less* than a power impact wrench.)

You don't believe it? One demonstration will convince you. Line up your toughest job and give your Industrial Distributor a call. If Swench can't do it, no tool can.

Don't wrench it—SWENCH IT!

CURTISS WRIGHT

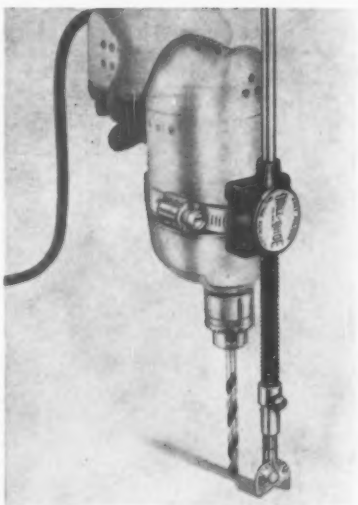
MARQUETTE DIVISION

1145 Galewood Drive, Cleveland 10, Ohio

FACTORY/EQUIPMENT NEWS

Begins on page 84

For more about these items, circle item numbers on Reader Service Card next to back cover.



133—Drill-Guide attaches to any portable power drill to assure drilling straight holes in all directions. Clamp, once installed on drill, may be left permanently. Two graduated dials regulate up-and-down or left-and-right drilling. *Ames Precision Machine Works.*

134—Loadtrol maintains pre-set load on drive motor of process equipment, machine tools, or web handling machinery. Senses change in load, automatically corrects it. Uses solid state components, no tubes or relays. Optional explosion-proof enclosure. *Jordan Controls.*

135—Automatic scale, for conveyor lines, records individual weights and gives total. Can be adapted to reject weights outside pre-set tolerance. Weight indicator and print-out can be mounted 25 ft. away without loss of accuracy. Range to 1 ton. *Dynametrics Corp.*

Turn to page 106

For more facts Circle 429 on Reader Service Card **Circle 430 on Reader Service Card for item on next page**

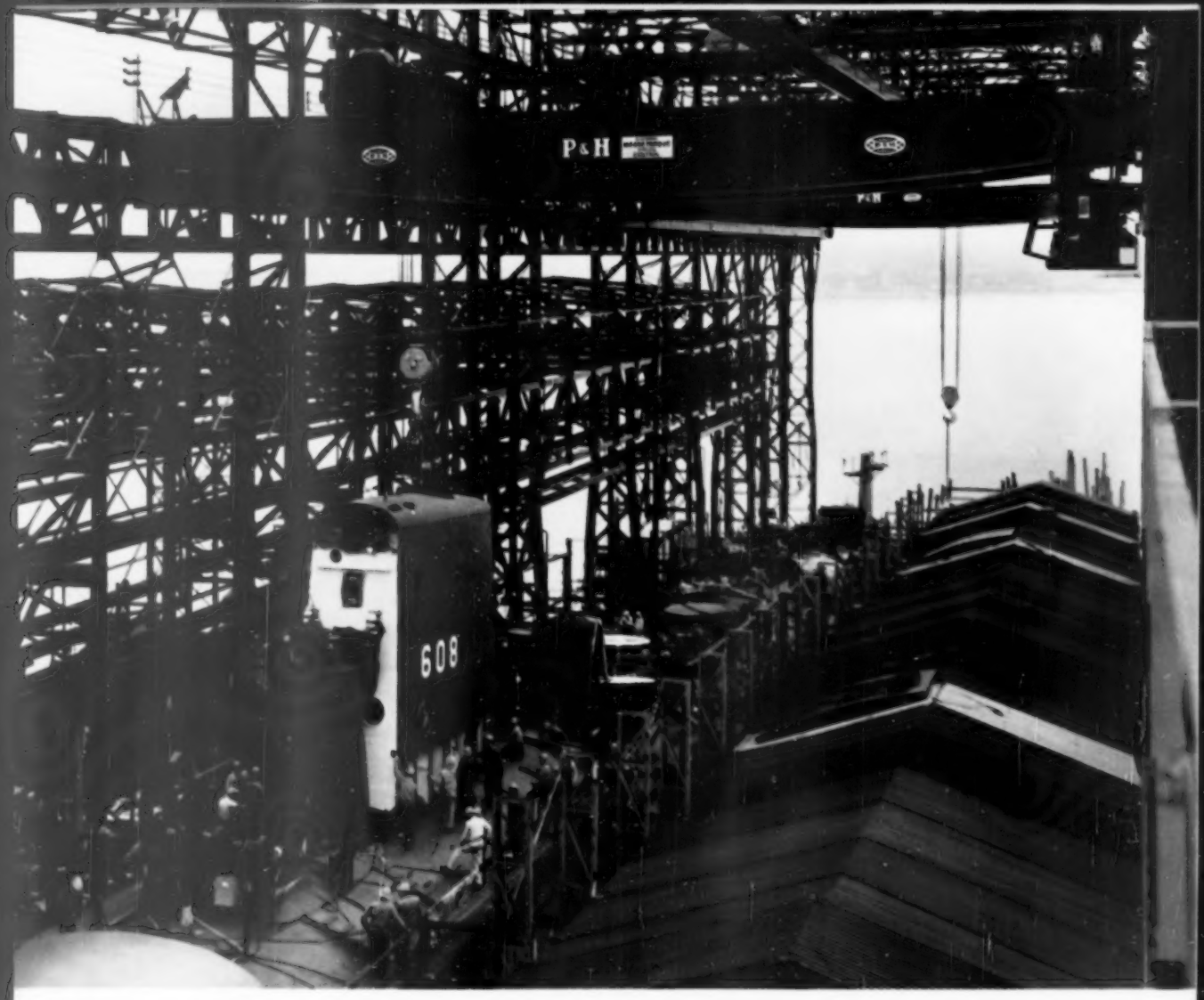


Photo Courtesy Electric Boat — a division of General Dynamics Corporation, Groton, Connecticut.

FOR EVERY APPLICATION, THERE'S ONE CRANE OUTSTANDING...

IN SHIPBUILDING . . . One of the many sensitive jobs in the construction of the "Ethan Allen," the U. S. Navy's newest nuclear powered missile submarine, is "setting the sail" — lowering the streamlined super-structure into position. It's a job that demands brute strength combined with razor-sharp precision control. A P&H overhead crane with P&H Electronic Stepless Magnetorque Control handles this assignment quickly, safely, and confidently.

As in every crane installation, P&H engineers have taken all factors affecting performance into consideration. The individual requirements, as well as the special problems, of this shipyard are integrated into the overall design. Result: performance that is never in doubt, dependability that users have counted on for over 76 years!

Job-engineering like this is the only proven way to keep your crane operating costs to a minimum — year after year, decade after decade. Why not find out more? Send for Bulletin C-68, Dept. 130, Harnischfeger Corporation, Milwaukee 46, Wisconsin.

Modern, all-welded construction eliminates excess bulk and weight in P&H's girder design. This means less wear, lower maintenance because there's less load on crane bridge wheels and support structures. In addition, cover-plate breakage is eliminated. Trolley-wheel loads are transmitted directly to web plates . . . no rivets to work loose.

P&H
OVERHEAD CRANES

HARNISCHFEGER
Milwaukee 46, Wisconsin

AIRCRAFT PARTS— HANDLE WITH CARE!

Photo courtesy Northwest Orient Airlines, St. Paul, Minnesota.

Part for part, one of today's turbo-prop or pure jet transports represents an investment that would have bought an entire fleet of planes a few years ago. Overhaul and maintenance procedures for these planes include extra-careful, jet-age methods for quick, safe, reliable handling of every airframe or power-plant part.

Northwest Orient Airlines' new maintenance center is equipped with P&H Balanced Design Hevi-Lift hoists in every department. These hoists provide the right combination of smooth lifting power plus precision spotting control to handle aircraft components with maximum care and minimum effort.

What's more, every P&H hoist in this most modern shop is equipped with the new P&H Pull-A-Hoist — a separate motor-driven tractor unit that provides smooth rolling power and precision positioning of each hoist at the touch of a button. No more lost time tugging or lugging of parts for Northwest's busy mechanics and maintenance specialists!

Bulletin H-63 gives you the complete data about the P&H Pull-A-Hoist — America's newest, most efficient hoist-tractor. Write Dept. 229, Harnischfeger Corp., Milwaukee 46, Wisconsin, today!

P&H
ELECTRIC HOISTS

HARNISCHFEGER
Milwaukee 46, Wisconsin

Read this . . . Order this . . . Install this . . .

Save up to ⅓ the cost of your next conveyor with Handidrive components

Why pay big premiums for unnecessary custom engineering? Order your next conveyor mail order style . . . right out of STANDARD CONVEYOR's new *Handidrive* Handbook. Get fast delivery right off the shelf . . . save up to ⅓ the usual cost.

How? Using this valuable new Handbook, you can plan your own installation, order the components you need from factory stock, and then assemble them yourself with simple tools to save on erection costs. And, should you need help, our conveyor specialist in your city will be happy to give free advice on layout, ordering, prices and installation.

In-stock *Handidrive* components include gravity and power roller sections, belt sections, drive units, curves, supports, hangers, tapered sections, guardrails, feed sections, diverters —everything you normally need for an efficient, low-cost conveyor installation.

Moreover, all components are interchangeable to simplify future alteration of your *Handidrive* system to meet changing material handling requirements.

Check these Standard-ized Handidrive "right-off-the-shelf" benefits

- Lower initial cost . . . you buy only what you need!
- Inexpensive to alter or add to.
- Stock items cost us less to build . . . cost you less to buy!
- The most complete line of fully integrated units all from a single source.
- Ready to ship as fast as we can process your order!

Here's the Handbook *that tells you exactly what to do to cut costs with pre-engineered HANDIDRIVE conveyors. Send for your free personal copy now. Just fill in the coupon, attach to your letterhead and mail. Do it today!*

Standard Conveyor COMPANY

Sales and Service in Over 40 Cities
Look in your Yellow Pages under "CONVEYORS"

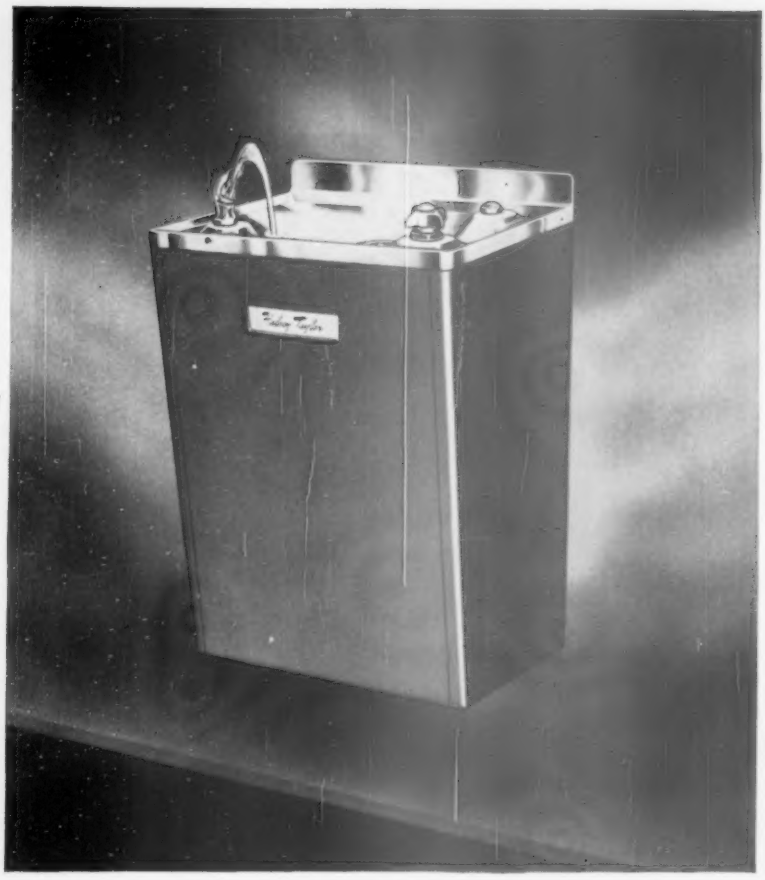
STANDARD CONVEYOR COMPANY

304-A Second Street, North Saint Paul 9, Minnesota

Please send me your new HANDIDRIVE Conveyor Handbook.

YOUR NAME_____

YOUR TITLE_____



This is the cooler that pioneered a trend

Just a little over a year ago no one ever saw a cooler like this. We call it the Wall-Mount, truly a Halsey Taylor first.

It mounts on the wall . . no exposed fittings, no space behind cabinet to catch dirt or grime! Off the floor . . room underneath for easy cleaning! The answer to maintenance-free installation and, like all Halsey Taylor fixtures, gives years of trouble-proof service.

The Halsey W. Taylor Co., Warren, Ohio

The Wall-Tite, big brother to the Wall-Mount. Fits tight to the wall.

Halsey Taylor®

Write for latest catalog, or see Sweet's or the Yellow Pages

THIS MARK OF LEADERSHIP IDENTIFIES THE MOST COMPLETE LINE OF MODERN DRINKING FIXTURES

161

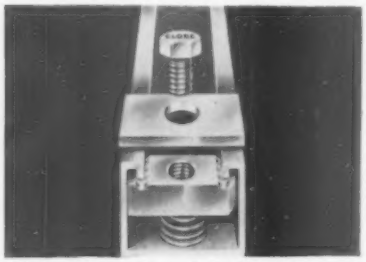
For more facts Circle 433 on Reader Service Card

FACTORY/EQUIPMENT NEWS

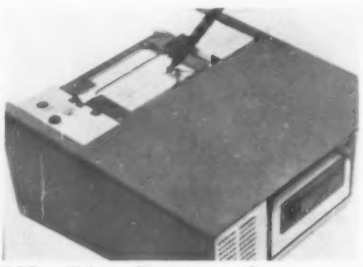
Begins on page 84

For more about these items, circle item numbers on Reader Service Card next to back cover.

136—Pipe guide, ¾ to 30 in., aligns and supports piping using bellows expansion joints, up to 6-in. axial movement. Guide spider clamps around pipe whose movement must be controlled; guide casing bolts to base. Two models for 1½- to 2-in. insulation. *Chemetron Corp.*



137—Channels and fittings, for any framing or suspension purpose, are set up with hacksaw and wrench by unskilled operator. Re-usable, can be disassembled and re-installed in new location. Triple-grip lock nuts provide high strength. Available for all needs. *Globe Co.*



138—Telescriber transmits message written directly on paper to receiver as far as 50 miles distant. Makes original and three carbons on transmitting unit. Compactness achieved with solid state circuits. Paper can be designed for any application. *TELautograph Corp.*

Turn the page

FALK

A GOOD NAME IN INDUSTRY

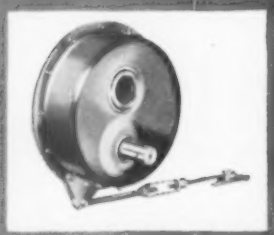
20,000 hp at 100 rpm

...or 75 hp at 100 rpm

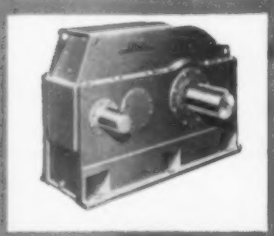
THE FALK *ALL-STEEL*, ALL-MOTOR MOTOREDUCER
(also available in Integral models)
...one of America's First Family of Power Transmission Products

Other Members:

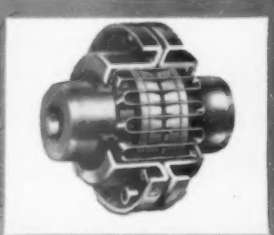
SHAFT MOUNTED DRIVES
—up to 125 hp. Ask for Bulletin 7100. Also Flange Mounted and Screw Conveyor Drives.



SPEED REDUCERS
Parallel Shaft up to 3500 hp. Ask for Bulletin 1100. Also Right Angle and Concentric Shaft designs.



STEELFLEX COUPLINGS
All-steel, torsionally resilient. 34 sizes, from .3 to 130,000 hp at 100 rpm. Ask for Bulletin 4100.



FALK, ALL-MOTOR and STEELFLEX are registered trademarks.

If you were in the market for a 20,000 hp propulsion drive for a blue-ribbon super-tanker, you would expect and demand the ultimate in gear accuracy. On turbine-driven gears as large as 15 feet in diameter and four foot face width, any deviation in tooth-spacing tolerances of .0001" to .0002" would spell poor performance or disastrous failure...the latter entailing loss of service of the ship and ruinously expensive repairs or replacements.

Falk, producer of millions of horsepower of marine propulsion drives for nearly fifty years, has been continuously adding to its gear making experience and techniques—and applying the results to all products, standard drives as well as large special units, with the same full respect for the importance of accuracy. Today's versatile All-Steel Motoreducer is a striking example of the application of these attitudes and skills in producing the many standard gear units used throughout your own industry.

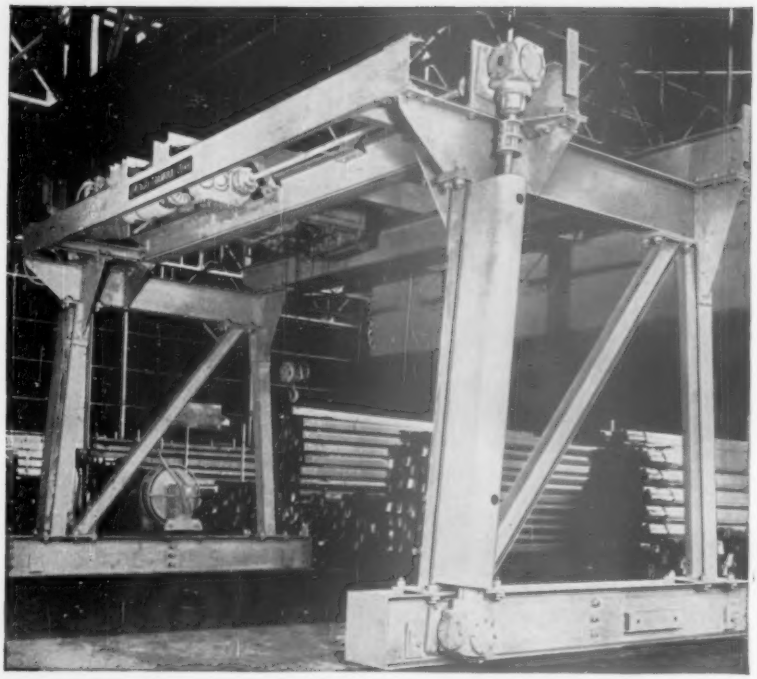
Falk gears have the highest known efficiency...98½% per mesh under full load...plus the famous Falk extra-depth, high-pressure-angle teeth. Benefits to you: better service, less maintenance, extra durability, true economy. Available in horizontal, vertical and right-angle models; sizes up to 75 hp. See your Falk Representative or Authorized Distributor—or write for Bulletin 3100.

THE FALK CORPORATION, MILWAUKEE 1, WISCONSIN
MANUFACTURERS OF QUALITY GEAR DRIVES AND FLEXIBLE SHAFT COUPLINGS
Representatives and Distributors in most principal cities

• • •

A POINT TO PONDER...when you need gear drives or shaft couplings of "FALK OR EQUAL" quality, where but from Falk can you get the "OR EQUAL"?

For more facts Circle 434 on Reader Service Card



CHICAGO TRAMRAIL

GANTRY CRANES

At the modern plant of one of the country's largest aluminum companies, Chicago Tramrail Gantry Cranes handle long extruded pieces from a 14,000-ton extrusion press . . . transfer these pieces to other operations throughout the mill.

Fourteen Chicago Tramrail Full Gantry Cranes provide individual handling equipment for individual operations to eliminate waste time waiting for busy overhead cranes. Designed for heavy-duty, continuous service, these Gantries are built with maximum headroom and maximum clearance between legs to operate independently under the large overhead cranes.

For a practical, economical solution to your materials handling problems, see our experienced engineers. Special designs, sound engineering and broad application knowledge qualify us for helpful service.

CHICAGO TRAMRAIL CORPORATION

1314 SO. KOSTNER AVENUE • CHICAGO 32, ILLINOIS

OVERHEAD CRANES • JIB CRANES • STACKER CRANES • MONORAIL SYSTEMS

For more facts Circle 435 on Reader Service Card

FACTORY/EQUIPMENT NEWS

Begins on page 84

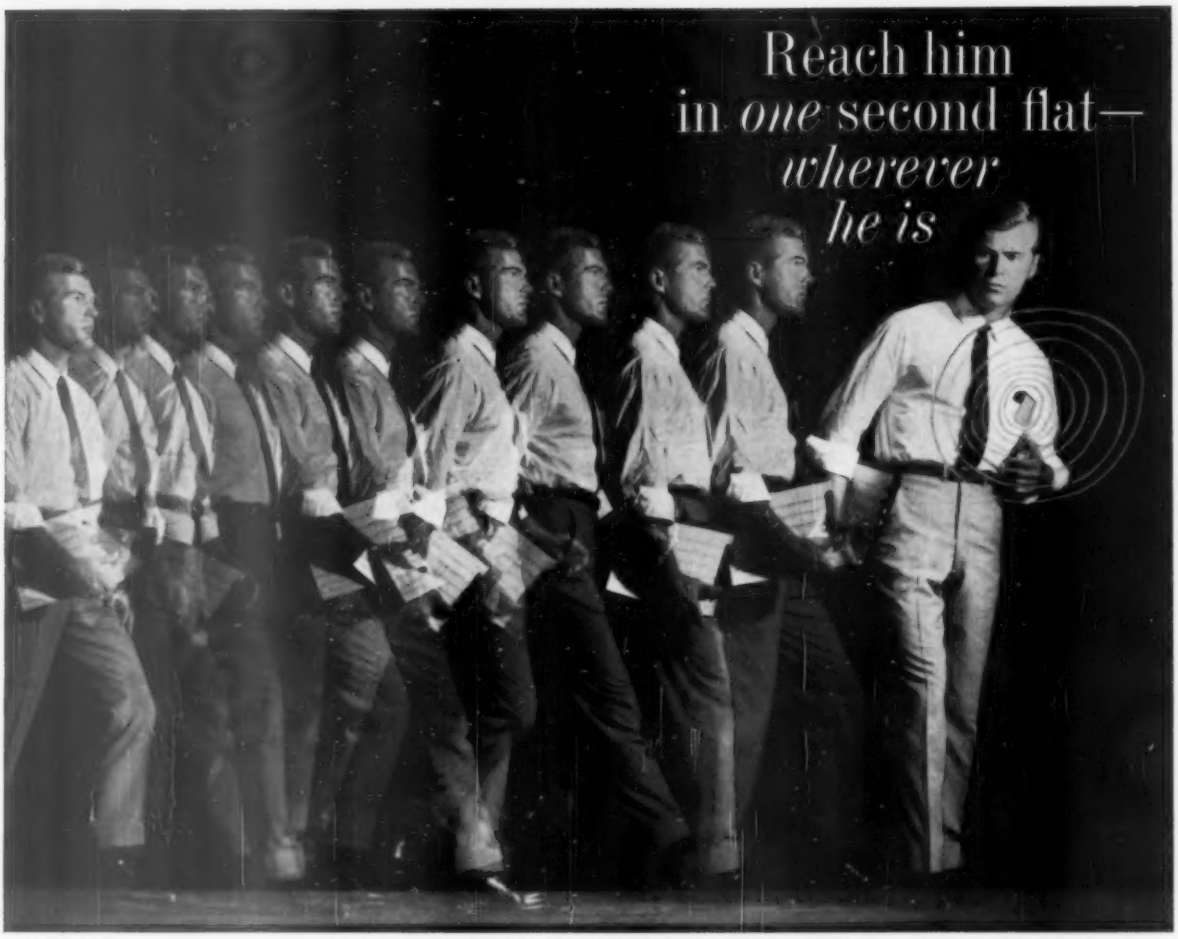
For more about these items, circle item numbers on Reader Service Card next to back cover.

139—Video transmission system permits viewing, on TV screen, microfilm material transmitted from central station. Electronically enlarges to 60 times microfilm size. No need for costly TV equipment. Useful for conference viewing. *Nord Photocopy & Electronics Corp.*

140—Infra-red relay detects temperature changes of remote objects to actuate water sprays, take-up reels, pouring devices, etc. Ultra-sensitive—reacts to objects (to 1100 F.) as small as 1 in. at 10-ft. moving at 6 in. per sec. No water cooling. *Daystrom, Inc.*

141—Fab-Ezy tool prepares copper tubing and fittings for fast, accurate fabrication. Cuts, cleans, reams, deburrs. Self-contained, portable tool insures lifetime joints, eliminates costly leaks. Swivel base, on-off control switch. *Toledo Pipe Threading Machine Co.*

Turn the page



He might be in the maintenance office, next door . . . in the tool room at the other end of the factory . . . outdoors, getting into his car – now you can contact him instantly, privately.

The transmitter of the PAGEMASTER® Wireless Paging System sends coded tone signals by short-wave radio . . . received only by the pocket-size transistorized receiver of the one person you wish to reach. The signal repeats every 20 seconds until he answers the call.

Sending the signal is just as convenient. The compact ENCODER of the PAGEMASTER® system will accommodate 455 selective receivers and can page up to 4 people simultaneously. Add any number of extensions at a later date.

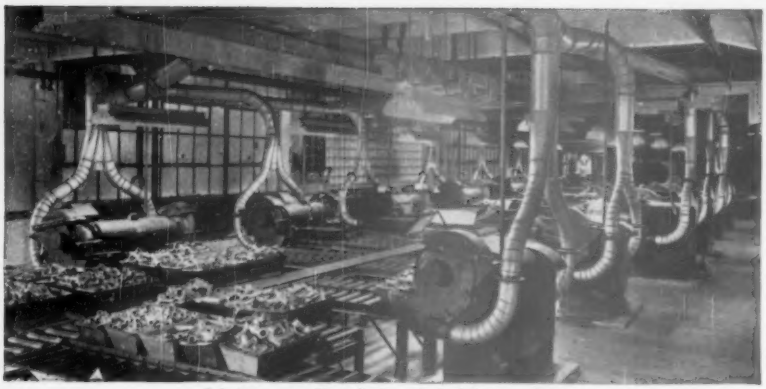
In addition to utmost speed, efficiency and flexibility, PAGEMASTER® offers very substantial economic advantages. It is obsolescence proof. Initial installation costs are low because you buy only what you require and add as need arises. There are no costly cable, speaker or light installations. The simplicity of the PAGEMASTER® Selective Wireless Paging System assures you minimum maintenance and lowest possible operator-time costs. For full information and literature, write to:

Commercial Products Division
Box F, 1401 N. Goodman Street
Rochester 3, New York

PAGEMASTER®
SELECTIVE WIRELESS PAGING SYSTEM

Remember . . . your Stromberg-Carlson Communications Consultant is only a local phone call away from you. He will be glad to analyze your communications problem and give you every possible help without obligation.

STROMBERG-CARLSON
A DIVISION OF **GENERAL DYNAMICS**



Grinding operation, dust control piping overhead.

No two dust control problems are alike!

Grinding operation, dust control "down draft" under floor.

Since no two dust control problems are alike, a Kirk and Blum engineering survey determines the exact nature of *your* specific application. It's all part of K & B's *complete* service to assure you the best system for your particular need, all factors considered.

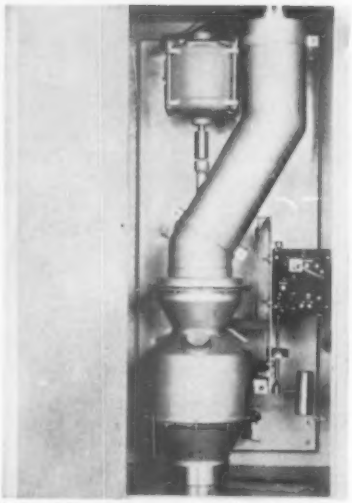
From survey time until the system is completed and in operation, Kirk & Blum handles the entire job with one undivided responsibility . . . a condition only possible when you have *one* source for all service, *one* guarantee for all components.

Write today for the new 52-page K & B Catalog or a no-obligation survey of your particular problem. The Kirk & Blum Mfg. Co., 3209 Forrer St., Cincinnati, 9, Ohio.

KIRK & BLUM *Complete Dust Control Systems*

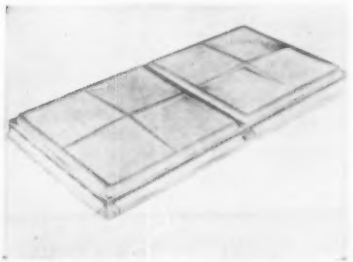
For more facts Circle 437 on Reader Service Card

For more about these items, circle item numbers on Reader Service Card next to back cover.



142—Dry flowmeter is low-cost, precision device that weighs and meters dry products without interrupting flow. Has accuracy of ±1%. Can be installed in most existing spouting systems to further automate dry flow process. In various sizes. *Industrial Processes, Inc.*

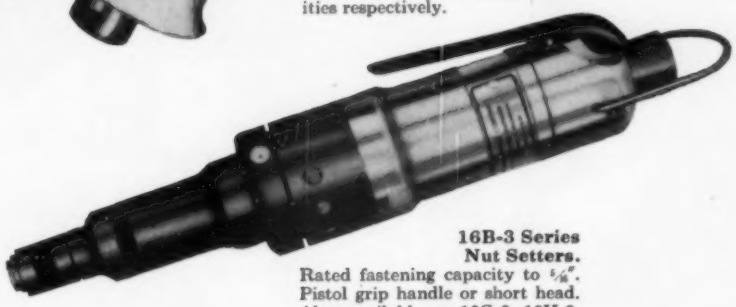
143—Fused interrupter switchgear, for power-switching centers, has short circuit capacity to 780,000 kva. at 14.4 kv. Fuses, switches coordinated as single assembly rating. Switches can close against faults. Rated 5 to 15 kv., 600 and 1200 amp. *I-T-E Circuit Breaker Co.*



144—PaneLiner is one of new line of low-cost, versatile fixtures for all-purpose industrial and office use. Model (four 40-watt lamps) costs under $30 in quantities. Mounts flush; plastic diffusing louvers light up ceiling. Five-year lease plan. *Graybar Electric Co.*

DRILL ...SET... DRIVE

11B-3 Series Air Drills. Powerful and lightweight for continuous duty. Rated to ⅜" capacity. Pistol grip or offset handle, or short head. Also available as 11G-3 and 11HA-3 Series Angle Drills. ¼" and ⅜" rated capacities respectively.



16B-3 Series Nut Setters. Rated fastening capacity to ¼". Pistol grip handle or short head. Also available as 16G-3, 16H-3, 16HA-3 Series Angle Nut Setters. Wide range of attachments permits almost unlimited applications to ⅜" nominal capacity. Straight handle or short head.

12B-3 Series Screw Drivers. Nominal fastening capacity to ¼". Pistol grip, offset handle, or short head. Also available as 12G-3 Angle Screw Drivers; ⅜" rated capacity; straight handle or short head.

faster than ever before with NEW Gardner-Denver no. 3 series air tools

Here's a new line of air tools designed to keep any production line stepping faster than you've ever known. Drills, screw drivers, nut setters—in-line and angle types—are available with a complete selection of interchangeable attachments.

New, powerful air motor gives better performance with less noise than ever before. Motors used in the entire series are identical—permitting the wide range of versatility, adaptability and interchangeability.

Further versatility. All attachments used on the Series 2 basic motor unit are also adaptable to the new Series 3 basic motor unit—adding even greater flexibility to Gardner-Denver's complete line of air tools.

Get all the facts on this No. 3 series—the line designed with production in mind. See your Gardner-Denver air tool specialist or write for bulletins.

EQUIPMENT TODAY FOR THE CHALLENGE OF TOMORROW

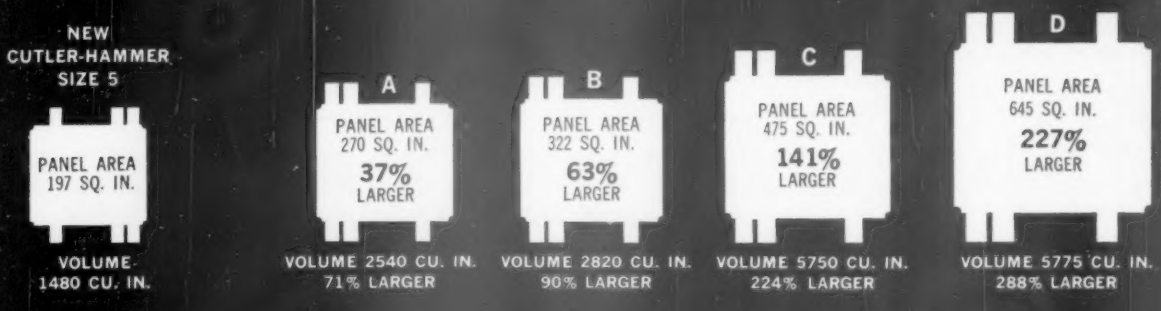
GARDNER-DENVER

Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Ave., Toronto 16, Ontario

For more facts Circle 438 on Reader Service Card

THE NEW CUTLER-HAMMER SIZE 5 STARTER IS FAR MORE COMPACT THAN OTHERS



Now! A complete line of easy-to-install Cutler-Hammer Starters including a new compact Size 5

7 sizes for use as components or as complete starters

(Size OO, O, 1, 2, 3, 4 and 5)

Now get all the advantages of Cutler-Hammer's Three Star starter line in seven sizes. You can control motors from fractional hp up to 200 hp, now that the new Size 5 is available.

The new Size 5 starter needs only an eight-inch deep case. Its open dimensions are only 13″ wide, 15 3/16″ high, 7½″ deep . . . and is available as a non-reversing or reversing starter or as a contactor.

Even the wiring's easier. Instead of struggling to force the line and load cables into the lug connectors, the lugs unbolt, and are easily reassembled.

You still get, of course, the famous Three Star advantages that have made Cutler-Hammer Starters so famous: dependable pivoted armature, vertical contacts that don't collect dust, ease of installation, ease of inspection and maintenance, plus many other features.

Be sure to send for Pub. LO-69-A211 to get all the facts on the complete Cutler-Hammer Starter line.

What's New at Cutler-Hammer? There's a new spirit here. You can see it in the new products, the new engineering talent, the increased plant capacities. We're ready for the great growth of the sixties so you can be ready to meet the great demands upon your capacities. We'd like to tell you more. Contact the Cutler-Hammer electrical distributor or the Cutler-Hammer sales office nearest you.

WHAT'S NEW? ASK...

CUTLER-HAMMER

Cutler-Hammer Inc., Milwaukee, Wisconsin • Division: Airborne Instruments Laboratory • Subsidiary: Cutler-Hammer International, C. A. Associates: Canadian Cutler-Hammer, Ltd.; Cutler-Hammer Mexicana, S. A.

HUMAN RELATIONS

By V. E. LUNARDI, Assistant Editor, FACTORY

Squeezing profits out of paper

Squirming in the profit squeeze? There may be a way to save money by putting your "paper house" in order. The Kearfott Division of General Precision, Inc. (Little Falls, N. J.) began to do it when paperwork costs hit an average $7-million annually.

The campaign enlists cooperation of all employees to cut paperwork down to the absolute minimum necessary to get things done. Systems and procedures are getting a streamlining. Every report, form, and piece of correspondence is being evaluated on the basis of necessity. To keep non-essential records down, filing systems are being revamped. Workshops teach secretaries and clerks record-keeping shortcuts to minimize paperwork in office files.

To realize the advantages of such an operation, consider these statistics. Business experts claim it costs the company about 1¢ yearly for each piece of paper filed. With more than 6000 file drawers containing 20-million standard-size sheets, it costs Kearfott nearly $250,000 annually to keep files. Stacked one on top of the other, this paper pile would tower 500 feet over Pike's Peak.

More leisure (for moonlighting?)

Moonlighting (holding down a second job) will get worse before it gets better. The reason: more and more leisure time due to an ever-shrinking work week.

Pressure for a shorter work week shows no signs of letting up. The past decade saw the work week shrink to five days. And the push for a still shorter week continues. That's the opinion of Alan C. Filley, faculty member at Ohio State University (Columbus), expressed recently in the American Management Association's *Personnel* journal.

He predicts that the four-day week at what is now five-days' pay will become the general rule in about 10 years, at present rates of productivity. By raising productivity, it may happen even sooner.

So what does moonlighting mean to management? Nothing much at present, judging from a recent survey. This showed that companies do not object to hiring moonlighters. These men are criticized only when their work suffers through outside activities.

This complacency should now be replaced by clear-cut management policies to prepare for the expected increase in moonlighting. Flexible employment rules could be worked out for the mutual benefit of both management and worker should the four-day week come to pass. Those who want more leisure would have it. Others could put in longer hours without the burden of overtime pay now imposed on employers. Some who want to could work even less than the short week. Whatever the solution, management must face this problem and come up with some new answers.

And what of the unions? They take a dim view of the practice of moonlighting. It cuts into the very core of their existence—to fight for shorter hours so the worker can enjoy his leisure!

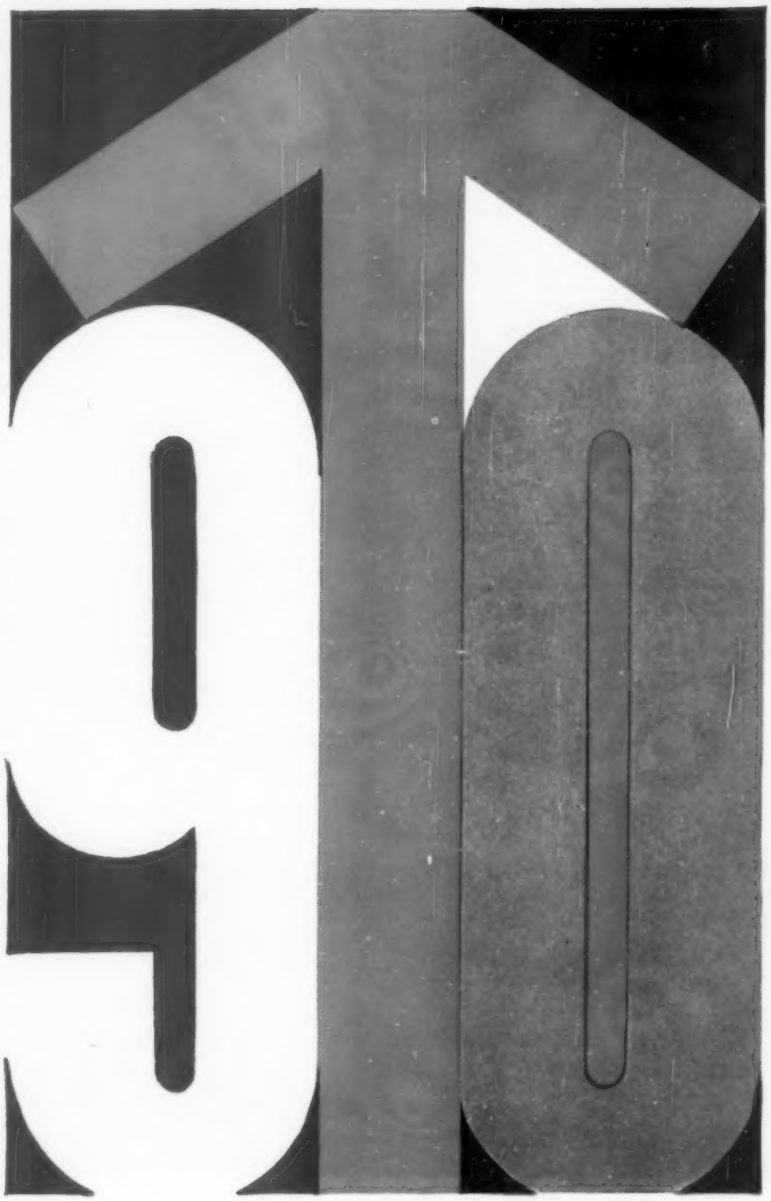
Employees stir up a stew

Why not a contest to take advantage of workers' culinary abilities and spark up the cafeteria menu with their unusual recipes? Before you could say "tabasco sauce" the commissary staff at Grumman Aircraft Engineering Corporation (Bethpage, N. Y.) sponsored a recipe contest for all actively employed men and women (cafeteria cooking staff excluded).

Entries are limited to a hot dish, salad, and dessert. Finalists in each category get a morning off to prepare their entry for tasting by the judges.

Winners are due for a double layer of recognition. Besides the honor of having their prize dishes featured in all the plant cafeterias, each winner gets to sample a dinner for two as guest of a chic Manhattan supper club. More permanent trophies, such as a specially engraved plaque, subscription to a food magazine, and plane models are additional awards.

Turn the page



New Airfoil Bladed Fans exceed 90% efficiency

It's here now—a new line of Airfoil Bladed Fans from American-Standard Industrial Division . . . all carrying the AMCA certified rating seal! A completely new design, these Airfoil Bladed Fans employ a highly efficient, quiet fan configuration ideally suited for general ventilation and industrial process applications. High mechanical efficiency, over the entire fan selection range, means the lowest possible power requirements. Get the complete story. Send for Bulletin A-1103 today. American-Standard Industrial Division, Detroit 32, Michigan. In Canada: American-Standard Products (Canada) Ltd., Toronto, Ontario.

American-Standard and Standard® are trademarks of American Radiator & Standard Sanitary Corporation

American-Standard Products

AMERICAN-Standard
INDUSTRIAL DIVISION

R-5091P respirator is shown in combination with 701 goggles. R-5051P respirator is also available.

New safety for paint spray operators

Just approved by the U.S. Bureau of Mines . . . this new AO paint spray respirator protects against sprays and vapors of enamels, lacquers and lead-based paints. If you're now using any of the AO R-5000 series respirators, you don't need a new face mask, not even a conversion kit. Just replace the cartridges with either of two approved new units, and get maximum protection.

This new AO paint spray respirator is compact, light in weight, combines maximum efficiency and service life with ease of maintenance. It is one of 17 combinations possible with the R-5000 series. By simply interchanging filter units in one basic face piece you protect against a range of hazards, including mercury vapors, highly toxic insecticide and radioactive dusts.

For further information on any R-5000 respirator model, contact your nearest AO Safety Products Representative, or write for folder S-1297.

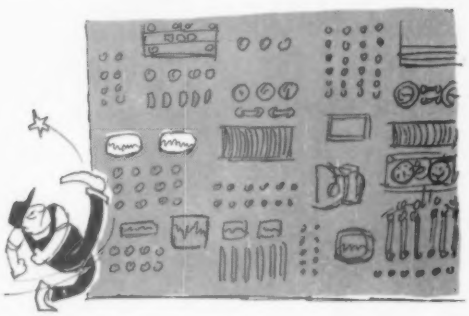
Your Surest Protection . . . AO SURE-GUARD Respirators

American Optical
COMPANY

SAFETY PRODUCTS DIVISION • SOUTHBRIDGE, MASSACHUSETTS

For more facts Circle 441 on Reader Service Card

Begins on page 114



Now it's automated layoffs

Layoffs are never like this in the U. S. Unions wouldn't let management get away with it. But in France, where it happened, the boss still has enough authority to let a machine make his decisions.

Faced with a layoff of 3000 auto workers, the highly automated state-owned Renault plant near Paris turned the choice of victims over to an electronic brain. It was fed punched cards with the records of 40,000 men and women. On the cards were such data as quality of work, professional worth, attitude toward rules and regulations, absenteeism.

In less time than it takes to say "formidable," out churned the names of 3000 least likely to be missed by the company. Of these, 1930 were dismissed.

The French trade unions, though not overjoyed with this method of free selection, are accepting the situation philosophically. At least the machine does not allow office politics to influence its decisions. And from last reports, management has expressed no complaints against the method.

"Banana break" is monkey biz

"Plant hires three chimpanzees, two employees fired" read a recent headline from Texas. In case you missed the story, a Houston furniture plant put three chimps to work, supposedly to stuff foam rubber into pillows, etc.

Union objection was over-ridden when contract clauses were found to cover human beings only, something the chimps were not. The Society for Prevention of Cruelty to Animals (SPCA) got into the act, but withdrew criticism when the boss promised an hour for lunch with all the bananas they could carry in their lunch pails. Even a 15-minute "banana break" was accorded the new "employees."

FACTORY's man in Houston burrowed through the banana peels and found a phoney publicity stunt—the work of a clever local public relations man. Two of the wire services treated the story as a legitimate labor experiment with animals when the tongue-in-cheek approach was more in order. In reality, the chimps stayed on the job for only three days to exploit all available publicity.

Turn the page

SEE IT WHEN IT

HAPPENS!

PHILCO CLOSED CIRCUIT TV has many applications that will speed production, control operations, improve communications, increase security *in your plant!*

Industry is rapidly adopting closed circuit TV to speed operations and reduce costs by enabling management and operating personnel to "see it when it happens"! Philco's broad experience in CCTV will help you to make the most efficient use of this modern and flexible business tool. Philco has pioneered in fully-transistorized equipment that provides maximum reliability and freedom from maintenance. It is as easy to operate as your home TV. Write today for your free copy of the Philco Closed Circuit TV System Planning Guide.

PHILCO ALL-TRANSISTOR SELF-CONTAINED CCTV CAMERA
For the finest in closed circuit TV

GOVERNMENT & INDUSTRIAL GROUP
4700 Wissahickon Ave., Philadelphia 44, Pa.
In Canada: Philco Corp. of Canada, Ltd., Don Mills, Ontario

PHILCO®
Famous for Quality the World Over

For more facts Circle 442 on Reader Service Card

FLAME-RESISTANT

Arno® DUCTAPE

TRADEMARK

FOR DUCTS AND INSULATION

- ✓ Complies with all building codes for flame-resistant duct tapes.
- ✓ Self-adhesive . . . sticks to any duct material or insulation.
- ✓ Will not support flame . . . holds firmly at high temperatures.
- ✓ Nothing to mix . . . saves labor.
- ✓ Vaporproof . . . waterproof.
- ✓ Meets ASTM standards.

Manufacturers Agents Wanted for Some Selected Areas

Write for **FREE** test sample!

ARNO ADHESIVE TAPES, INC.

Dr. Scholl's Adhesive Tape Division

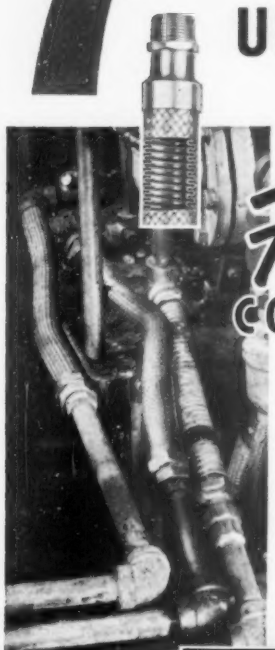
2100 Ohio St., Michigan City, Ind.

For more facts Circle 443 on Reader Service Card

7 REAL ADVANTAGES with UNIVERSAL

"UC3" STANDARD ALL-METAL STAINLESS STEEL

Flexible CONNECTORS



- Convey Corrosive Gases and Fluids
- Expansion Movement Absorbed
- Vibration Dampened
- Simplifies Misaligned Hook-Ups
- Saves Installation Time
- Braided for Extra Strength
- Completely Leakproof

Also available in Bronze or Carbon Steel

TODAY . . . Write for descriptive literature

2147 SOUTH KEDZIE AVE. CHICAGO 23, ILL.

QUALITY... Factory Assembled and Tested All-Metal Flexible Hose Products

Universal METAL HOSE CO.

For more facts Circle 444 on Reader Service Card

But wait. Not all working animals are publicity concoctions. In December 1959, FACTORY broke the news that a pigeon had been trained to do 99% accurate visual inspection of small parts. Now that inspector was really a bird.

Square executives in round jobs

What industry needs is an accurate method of measuring a manager's performance. Then we could put to use the full inherent capacity of many managers who are in jobs ill-suited to their abilities. Often all but a fraction of that capacity is being wasted, says Robert Stolz, senior consultant at McKinsey & Company, New York management consultants.

Also in the line of fire were executive development programs. In his opinion, those dealing with executive counseling of subordinates to improve performance are largely ineffective. And the reason? Executives lack confidence in their judgment of the abilities of subordinates.

Stolz suggests the answer lies in sound performance appraisals. These should be based on up-to-date knowledge of the function of each management position and the way it can best make its maximum contribution. On the executive-subordinate relationship, he recommends a frank exchange of views on vital job problems rather than current evasive techniques.

New employer shuts town down

Business was not going on as usual at Batesville, Ark., thanks to the Seiberling Rubber Company. For three hours, from 12 to 3 p.m. on a recent Tuesday, the town looked deserted. Stores, restaurants, and banks were closed. The occasion: groundbreaking ceremonies for a new plant that is expected to initially employ 100. So welcome was this future (midsummer 1961) addition to the community that the local Chamber of Commerce sponsored a gigantic barbecue at the future site of the rubber plant.

But why the enthusiastic participation by 2000 of the town's citizens? It was they who voted 97% in favor of special tax and bond measures to permit the county to help finance the $1,300,000 project.

This Patented

CLIP and STUD

makes LYON your BEST SHELVING INVESTMENT

Design makes the difference! Don't settle for less than the exclusive Lyon CLIP and STUD which many have tried to copy but none can duplicate. Fully protected by Government patents, Lyon CLIP and STUD obsoletes conventional steel shelving and guarantees you these *extra dividends*—

- ★ Easy, fast, low cost assembly.
- ★ Complete flexibility—shelves instantly adjustable from the front without use of nuts, bolts or tools.
- ★ Tremendous structural strength and rigidity.

Another extra dividend from Lyon—oldest and leading steel shelving manufacturer—an experienced Lyon Storage Engineer and Lyon Dealer as near as your phone—ready to help you save space, time, money.

There is a type of Lyon Shelving for every application—open, closed, bin, counter, sliding shelf, tool, mezzanine. Above—a typical tool room installation.

Factories in Aurora, Ill.—York, Pa.—Los Angeles

LYON METAL PRODUCTS ®

OVER 1500 ITEMS

For Business, Industry and Institutions

MAIL COUPON FOR THE 100-PAGE CATALOG

LYON METAL PRODUCTS, INC.
112 Monroe Avenue, Aurora, Illinois

☐ I would like to see a Lyon CLIP and STUD demonstration.

☐ I'd like a copy of your 100-page Catalog which tells the complete shelving story and covers entire line of products.

NAME_____

FIRM_____

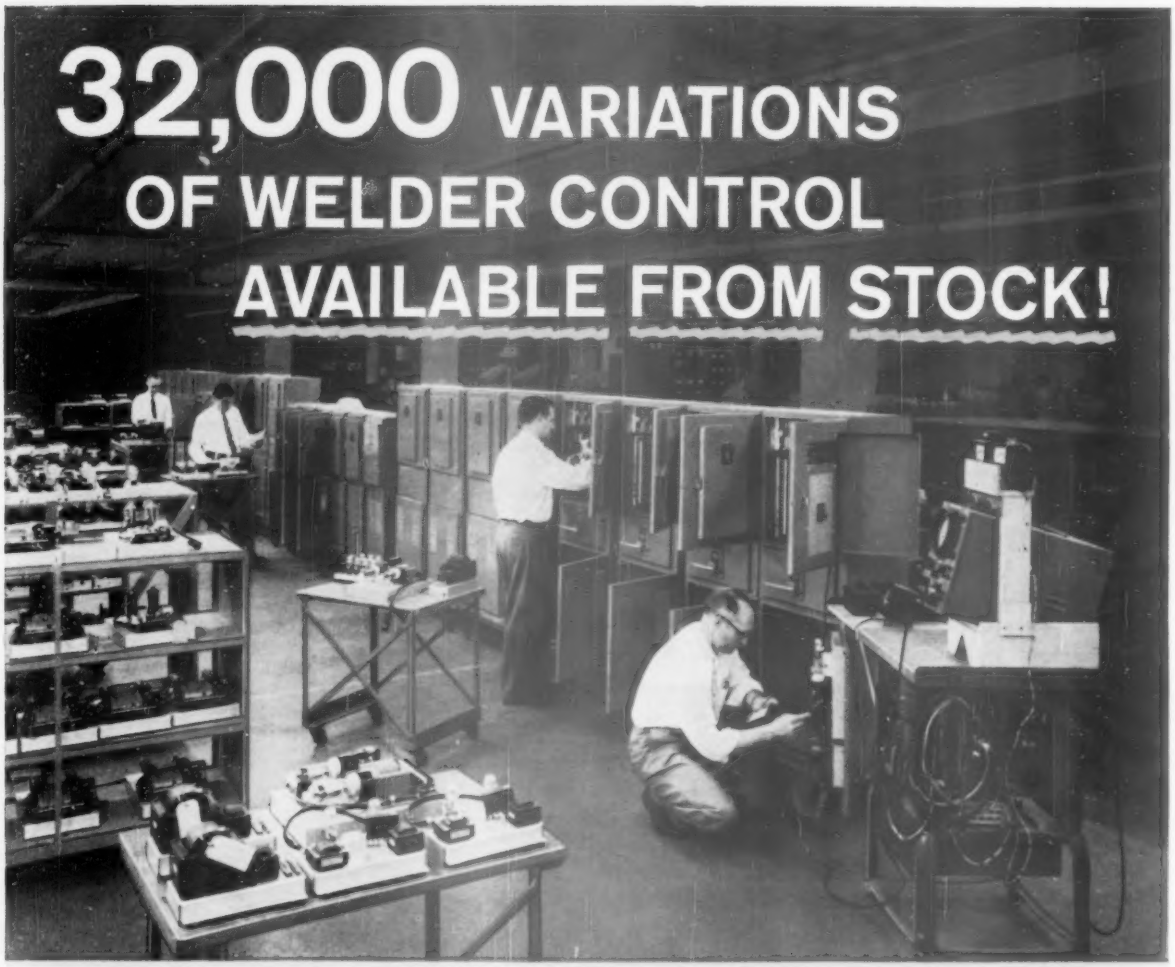
ADDRESS_____

CITY_____ ZONE____ STATE_____

A PARTIAL LIST OF LYON PRODUCTS

• Desks	• Storage Cabinets	• Bookcases	• Folding Chairs	• Sorting Files	• Tool Stands	• Cabinet Benches	• Display Equipment
• Tables	• Flat Drawer Files	• Coat Racks	• Service Carts	• Hopper Bins	• Tool Boxes	• Revolving Bins	• Hanging Cabinets
• Stools	• Drawing Tables	• Shelving	• Work Benches	• Drawer Units	• Parts Cases	• Toolroom Equip.	• Slotted Angle
• Lockers	• Filing Cabinets	• Bin Units	• Bench Drawers	• Shop Boxes	• Bar Racks	• Service Counters	• Wood Working Benches

32,000 VARIATIONS OF WELDER CONTROL AVAILABLE FROM STOCK!



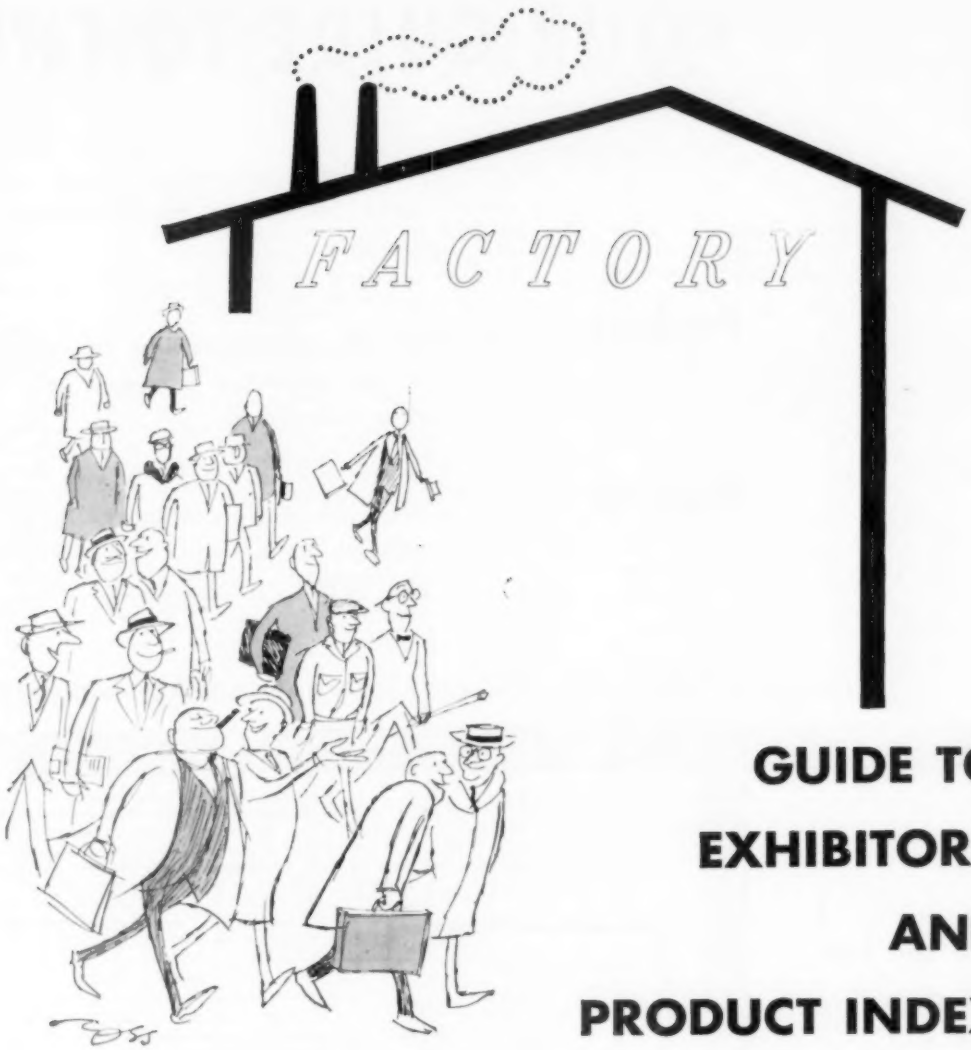
Square D "Building-Block" Construction means fast delivery of the Control you need

• When you need welder control—for any welding function—Square D can give you what you want, when you want it. More than 32,000 combinations of enclosures and plug-in panels can be made up from off-the-shelf stock to meet your exact requirements. The result—your control is made to order, thoroughly checked and tested, and shipped without delay. Similar facilities exist in warehouses from coast to coast, and warehouse stocks of plug-in panels are also available to assist Square D field engineers in on-the-spot service. • Square D plug-in construction lets you add control functions as you need them. Panels perform all NEMA standard functions, with either tube or relay firing, including heat, slope, current regulator, dual functions, forge and anti-repeat initiation. All NEMA standard enclosures are available, with or without disconnect switch, as well as enclosures to meet JIC specifications or your own special requirements. You can get the welder control you need from Square D—quickly!

Write for details. For the complete story on Square D welder control, write for Bulletin SM-277. Square D Company, 4041 North Richards Street, Milwaukee 12, Wisconsin

SQUARE D COMPANY

—wherever electricity is distributed and controlled



GUIDE TO EXHIBITORS AND PRODUCT INDEX

1961 National PLANT MAINTENANCE AND ENGINEERING SHOW

INTERNATIONAL AMPHITHEATRE, CHICAGO **JANUARY 23-26, 1961**

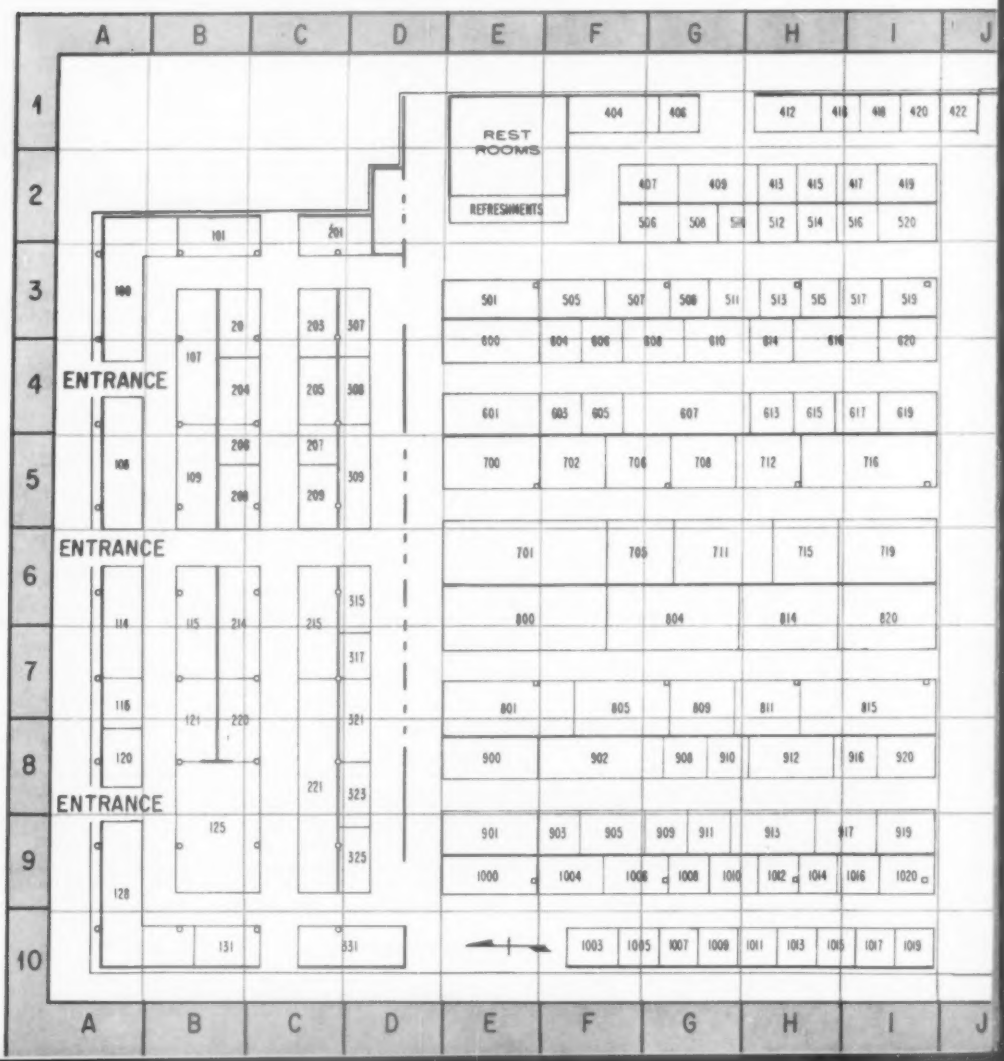
YOUR GUIDE TO THE PM&E

Exhibitors . . . . . Here's an alphabetical listing, by company name. Gives you booth numbers and map locations ..... At right

Products . . . . . All the problem-solving products on exhibit at the show are arranged into groups for your convenience ..... p. 136

Program . . . . . Don't miss the conferences. They're a chance to catch up on what the best brains in the field think ..... p. 174

FLOOR PLAN of the International Amphitheater, Chicago.



You can use this map to find any booth: Look up the company name. Find the map coordinates. Use the blue lines like coordinates on a road map.

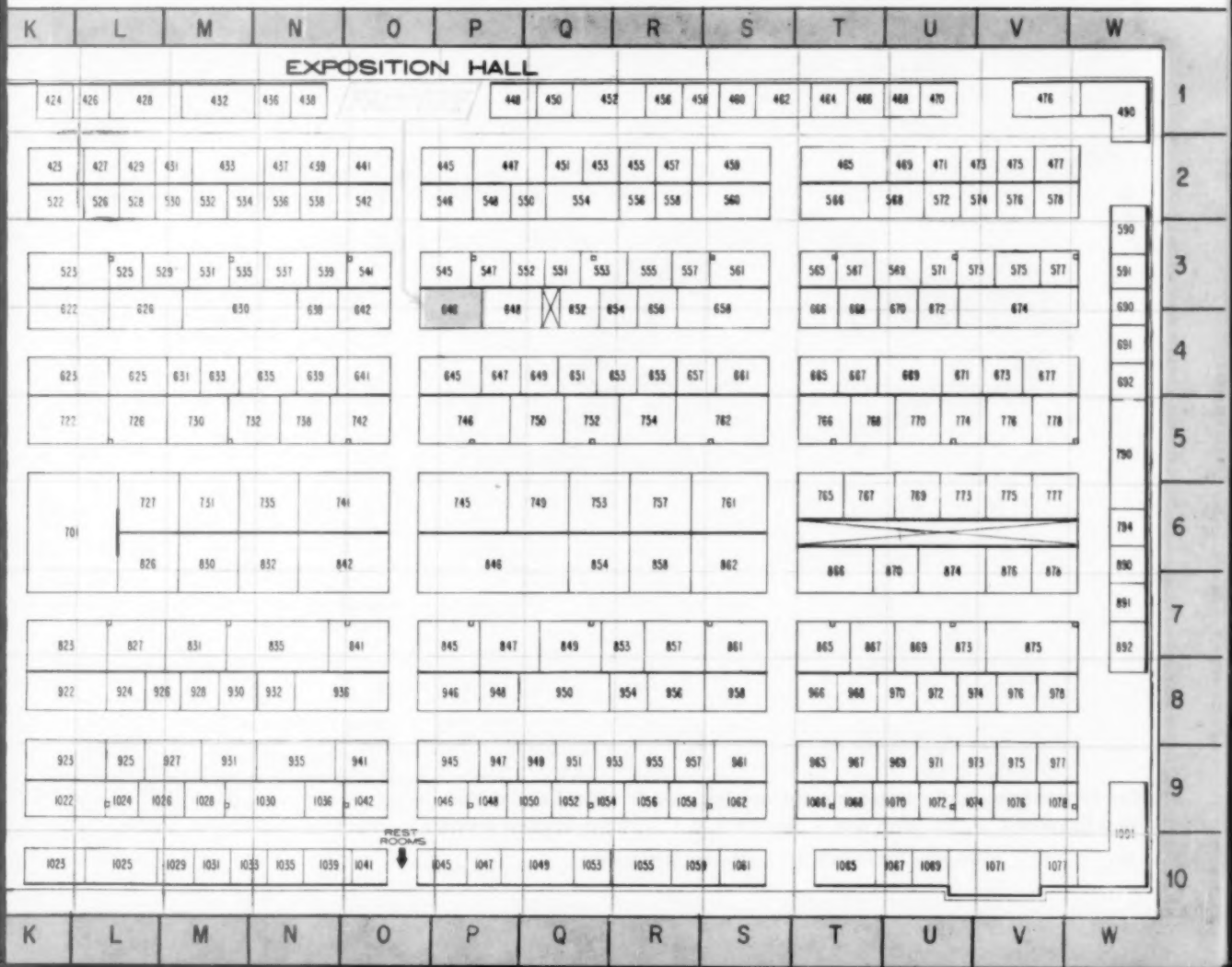
SHOW AND CONFERENCE

Guide to Exhibitors

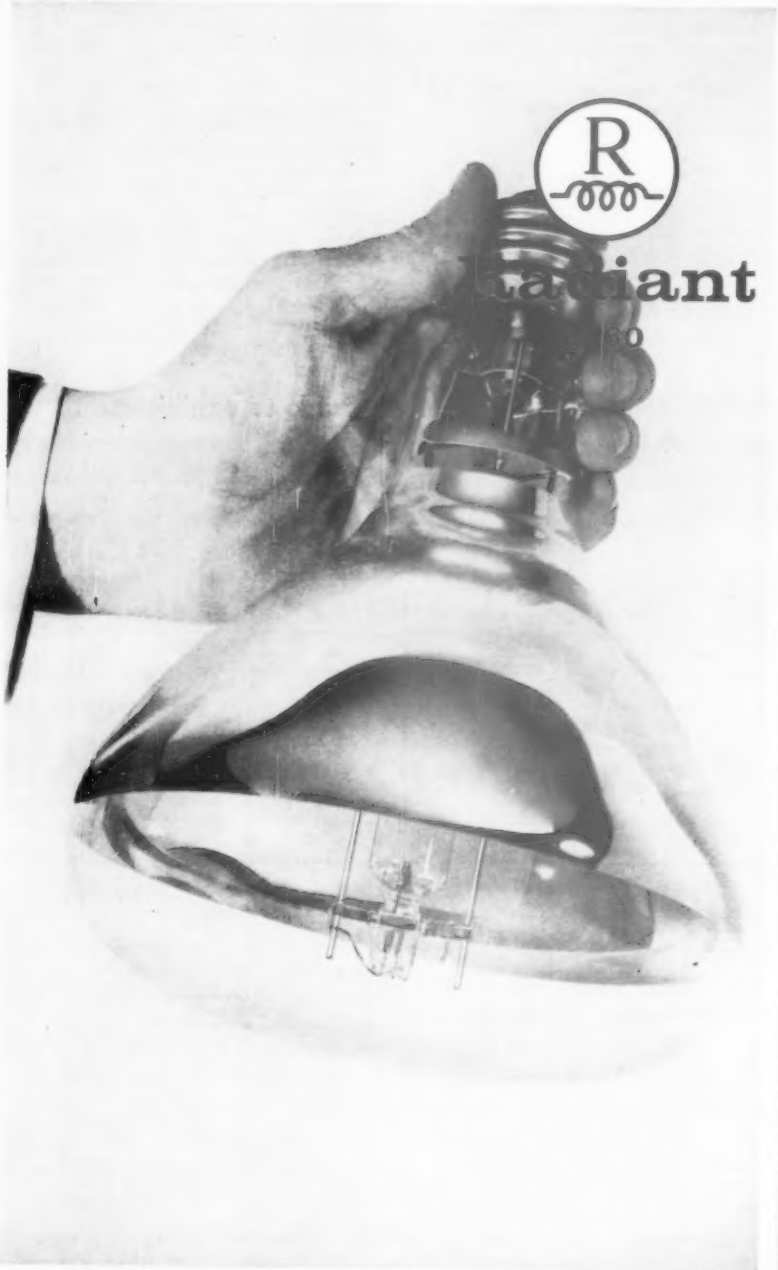
EXHIBITOR	BOOTH	MAP
A		
Acme-Hamilton Mfg. Corp.	757	R-6
Acme Steel Co.	722	K-5
Acme Visible Records, Inc.	716	I-5
Addressograph-Multigraph Corp.	978	V-8
Aeroquip Corp.	700	E-5
The Airetool Mfg. Co.	738	N-5
Airkem, Inc.	614	H-4
Air-Lec	1056	R-9
Ajusto Equipment Co.	413	H-2
Alan Packing & Rubber Co.	1058	R-9
Alan Wood Steel Co.	908	G-8
Albion Industries Inc.	874	U-6
Alemite Div., Stewart-Warner Corp.	902	F-8
Allis-Chalmers Mfg. Co.	221	C-8
American Abrasive Metals Co.	429	L-2
American Air Filter Co., Inc.	452	Q-1
American Chain & Cable Co.	820	I-6
American Cleaning Equipment Corp.	569	U-3
American Coolair Corp.	945	P-9
American District Telegraph Co.	1062	S-9
American Floor Products Co.	1036	N-9
American Gage & Mfg. Co.	466	T-1
American Lincoln Corp.	214	B-6
American-Marietta Co.	910	G-8
American Pamcor Inc.	215	C-6
American Pullmax Co.	642	O-4
American Sealants Co.	477	V-2
American Vamag Co.	116	A-7
Ames Publishing Co.	1003	F-10
Anaconda Metal Hose Div., American Brass Co.	649	Q-4
Anchor Coupling Co., Inc.	968	T-8
The Anchor Packing Co.	433	M-2
Appleton Electric Co.	525	L-3
Arcair Co.	892	W-7
The Arco Co., Div. of American-Marietta Co.	910	G-8
Armstrong Cork Co.	956	R-8
Armstrong Machine Works	927	M-9
The Aro Equipment Corp.	966	T-8
Arro Expansion Bolt Co.	909	G-9
Associated American Winding Machinery Inc.	853	R-7
Associated Laboratories Inc.	690	W-3
Associated Research, Inc.	541	O-3
Atlantic Metal Hose Co.	455	R-2
Aurand Mfg. & Equip. Co.	538	N-2
Automatic Transportation Co.	125	B-9
Automation	419	I-2

Turn the page

Coordinate lines, in blue, work with letters and numbers in guide to exhibitors.



This is the long lasting 400-W Radiant lamp that gives your plant brighter light for peak efficiency and greater safety...



For information about correct modern lighting, call or write Les Deutsch• **RADIANT** • 300 Jelliff Ave. • Newark 8, N. J. • Phone: Bigelow 3-6850

For more facts Circle 447 on Reader Service Card

GUIDE TO EXHIBITORS

Begins on page 123

EXHIBITOR	BOOTH	MAP
B		
Balcrank Inc.	967	T-9
The Ballymore Co.	731	M-6
Band-It Co., Inc.	913	H-9
Barber-Colman Co., Overdoor Div.	203	C-3
Barco Mfg. Co.	635	N-4
Barnes and Jones, Inc.	947	P-9
Barreled Sunlight Paint Co.	516	I-2
W. M. Bashlin Co.	417	I-2
The Bassick Co.	961	S-9
Richard C. Bennett Mfg. Co.	115	B-7
Best Universal Lock Co.	451	Q-2
The Bettcher Mfg. Corp.	1025	L-10
James G. Biddle Co.	620	I-4
Binks Mfg. Co.	735	N-6
The Black & Decker Mfg. Co.	1065	T-10
Blackhawk Industrial Div.	745	P-6
Boston Gear Works	811	H-7
Bowser Inc.	309	D-5
Bradley Washfountain Co.	412	H-1
W. H. Brady Co.	1046	P-9
Breuer Electric Mfg. Co.	946	P-8
The Briggs Filtration Co.	309	D-5
Brooks Chemicals, Inc.	953	R-9
Stewart R. Browne Mfg. Co.	437	N-2
Buchanan Electrical Products Corp.	691	W-4
Bulldog Div., Gregory Industries, Inc.	847	P-7
Butler Mfg. Co.	654	R-3
A. M. Byers Co.	625	L-4
C		
Callaway Mills, Inc.	930	M-8
The Philip Carey Mfg. Co.	702	F-5
Chamor Mfg. Co.	120	A-8
Change-O-Matic Corp.	517	I-3
Chiksan Co.	831	M-7
Chisholm-Moore Hoist Div., Columbus McKinnon Chain Corp.	546	P-2
The Cincinnati Tool Co.	949	Q-9
Cities Service Petroleum, Inc.	105	B-4
Clark, Cutler, McDermott Co.	962	S-8
Clark Door Co.	1061	S-10
Clarke Floor Machine Co.	607	G-4
Clements Mfg. Co.	556	R-2
The Clipper Mfg. Co.	507	F-3
Collins Machinery Corp.	708	G-5
Colonial Plastics Mfg. Co.	1049	Q-10
Columbus McKinnon Chain Corp.	548	P-2
Com-Pak-Ett Mfg. Corp.	460	S-1
Complete-Reading Electric Co., Inc.	1019	I-10
Consolidated Chemical & Paint Mfg., Inc.	1015	H-10
Continental-Emsco Co.	754	R-5
Cushman Motors	630	M-4
D		
Davey Compressor Co.	790	W-5
Dean Brothers Pumps, Inc.	950	Q-8
Dean Products, Inc.	447	P-2
Delaware Barrel & Drum Co.	677	V-4

Turn the page

2¢ worth of Loctite restores end-bell bearing fits in minutes

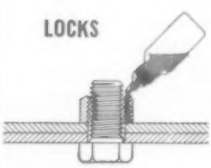
No longer need it be costly to maintain the fit between bearing and housing in electric motor end-bells. Loctite Sealant, the plastic that acts as a "liquid shim," has made the job a cinch.

Just a drop or two of Loctite on the bearing and the housing takes the place of these three common, but expensive, repair methods: (1) end-bell replacement, (2) boring out the housing, pressing in a steel sleeve, then machining the sleeve, (3) metalizing the housing, then machining.

Loctite is a thin liquid plastic with the unique property of hardening when confined between closely fitting metal parts. It comes ready-to-use, does not require mixing with a catalyst, and does not air dry. Bearings mounted with Loctite can be removed with ordinary bearing removal tools.

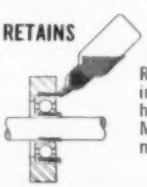
LOCTITE SEALANT—The Liquid Lock for Metal Parts has 1001 Uses

LOCKS



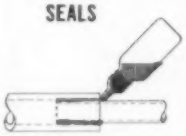
Stops costly breakdowns due to loose nuts and bolts. Makes any threaded part self-locking.

RETAINS



Repairs loose fitting bearings. Restores fit to worn housings and shafts. Makes bearing replacement easy.

SEALS



Seals joints pressure tight with tough plastic. No heating, no mixing, no pot life problems.

INDUSTRIAL DISTRIBUTORS · SERVING INDUSTRY ECONOMICALLY · THE RIGHT HAND OF PRODUCTION

You can count on your distributor salesman for service that keeps things running. Ask him for information on how to use Loctite to perform maintenance magic.

LOCTITE® SEALANT

AMERICAN SEALANTS COMPANY

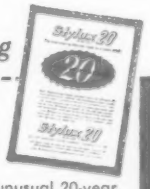
391 NORTH MOUNTAIN ROAD, HARTFORD 11, CONN.

Stylux 20
BY BUTLER ®

a revolutionary achievement in plastic panel quality

A 20-year guarantee for plastic panels! This is startling news. For since the original introduction of fiberglass panels, surface failures, with corresponding loss of color and translucency, have been the greatest deterrents to panel use. Now, a major technological breakthrough enables Butler Manufacturing Company to guarantee new *Stylux-20* to maintain a uniform surface condition under normal use, for 20 years. The guarantee is in writing.

Look for this guarantee tag



BUTLER MANUFACTURING COMPANY
Dept. 110, 7400 East 13th Street,
Kansas City 26, Missouri

Send full details on both *Stylux-20* and your unusual 20-year guarantee.

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ ZONE___ STATE_____

Stylux-20 is the lowest-cost glazing you can buy on a cost-per-year basis. Install it once and forget it. *Stylux-20* is shatterproof. It has the unique ability to withstand the harshest weather without surface deterioration. Its clear hardness provides up to 90% light transmission when used for windows or skylights. And because *Stylux-20* does not pit or erode, it's easy to clean . . . *stays* easy to clean.

New colors match *Stylux-20* to the most modern factory . . . yet because of their rich, harmonizing tones, bring new life to older plants as well. Most important, panel color and light transmission characteristics are fully protected by the special *Stylux-20* formula for the entire period of the guarantee.

You can use *Stylux-20* in a variety of applications such as glazing, skylighting, sun shades, decorative partitions or translucent sidewalls . . . using it with complete confidence of full utility without repeated repair or replacement.

Well worth looking into. Specific details are yours for the asking. Use the convenient coupon, or write direct. Taking a few moments to examine *Stylux-20* in detail . . . may well be worth many dollars in return.

See New Stylux-20 Exhibit—Booth 654—Plant Maintenance & Engineering Show, Chicago, January 23-26.

EXHIBITOR	BOOTH	MAP
Deluxe Metal Products Co., Royal Metal Mfg. Co.	835	N-7
Desco International Assn.	577	V-3
Detroit Controls Div., American Radiator & Standard Sanitary Corp.	955	R-9
Dexion, Inc.	568	U-2
Diamond Expansion Bolt Co.	308	D-4
Dispo Spray Booths	1077	V-10
Divine Brothers Co.	457	R-2
Joseph Dixon Crucible Co.	1050	Q-9
Doyle Vacuum Cleaner Co.	445	P-2
Dravo Corp.	1071	V-10
Drehmann Paving & Flooring Co.	767	T-6
Du Bois Chemicals Inc.	730	M-5
Duff-Norton Co.	762	S-5
Durametallic Corp.	1070	U-9
The Duriron Co., Inc.	530	M-2
E		
Eagle Mfg. Co.	509	G-3
The Eagle-Picher Co.	603	F-4
Ebco Mfg. Co.	861	S-7
Econo Mfg. Co.	1069	U-10
Economy Engineering Co.	557	R-3
Electric Cord Co.	661	S-4
The Electric Materials Co	653	R-4
Electro Rust-Proofing Corp. (N.J.)	531	M-3
Encyclopaedia Britannica	427	L-2
Equipto Div. of Aurora Equipment Co.	1091	W-10
The Erie Tool Works	552	Q-3
Eriez Mfg. Co.	520	I-2
Eutectic Welding Alloys Corp.	875	V-7
Excel Electric Service Co.	547	P-3
F		
Fabreeka Products Co.	428	L-1
Factory Magazine	646	P-4
The Fairbanks Co.	476	V-1
Faultless Caster Corp.	1042	O-9
Fenc Painter Div., Fence Painter Corp.	519	I-3
Fenway Machine Co., Inc.	613	H-4
Fibercast Co.	754	R-5
Fibre Glass-Evercoat Co., Inc.	453	Q-2
Filterite Corp.	555	R-3
Finnell System, Inc.	823	K-7
Fiske Bros. Refining Co.	849	Q-7
Flexible Steel Lacing Co.	1052	Q-9
Flexible Tubing Corp.	209	C-5
Flexonics Corp.	220	B-8
Foundry	419	I-2
Fuller Co.	114	A-6
G		
Gates Engineering Co.	510	G-2
Geerpres Wringer, Inc.	536	N-2
General Electric Co.	701	E-6
Gilmore Industrial Grinders	456	R-1
The Glidden Co.	706	F-5
The Globe Co.	936	N-8
Gravely Tractors, Inc.	513	H-3
Gray Company, Inc.	935	N-9
H		
Clifford B. Hannay & Son, Inc.	205	C-4
H. A. Harry Glass Co.	670	U-3
Hastings Pavement Co., Inc.	957	R-9
Hein-Werner Corp.	608	G-4
Helwig Carbon Products, Inc.	436	N-1
Hild Floor Machine Co.	919	I-9
Hilti-Rapid Fastening Systems, Inc.	891	W-7
Hollywood Plastics, Inc.	432	M-1
Holophane Co., Inc.	458	R-1
Homestead Valve Mfg. Co.	1022	K-9
Hoover Ball and Bearing Co.	827	L-7
A. C. Horn Co.	647	P-4
The Hydra-Action Co.	566	T-2
I		
Ideal Industries, Inc.	511	G-3
The Imperial-Eastman Corp.	542	O-2
Industrial Acoustics Co.	1039	N-10
Industrial Equipment News	925	L-9
Industrial Garment Service	648	P-4
Industrial Maintenance & Plant Operation	1003	F-10
Industrial Supplier & Distributor News	1003	F-10
Industrial Wiping Cloth Co.	842	O-6
Insto-Gas Corp.	528	L-2
International Research & Development Corp.	616	H-4
J		
Jamesbury Corp.	315	D-6
Johnson Bronze Co.	903	F-9
The Johnson Corp.	931	M-9
S. C. Johnson & Son, Inc.	619	I-4
Jones & Laughlin Steel Corp.	862	S-6
Jordan Industries, Inc.	1048	P-9
Joy Mfg. Co.	325	D-9
K		
Kaiser Aluminum and Chemical Corp.	561	S-3
Kalman Floor Co.	641	O-4
Kenco Pump Div., American Crucible Products Co.	941	O-9
Keystone Lubricating Co.	462	S-1
Walter Kidde & Co.	131	B-10
Kimberly-Clark Corp.	715	H-6
Kollmann Mfg. Co., Inc.	1020	I-9
The Korfund Co., Inc.	501	E-3
L		
Laduby Co., Inc.	605	F-4
Lake Chemical Co.	674	V-4
Lambert, Inc.	1031	M-10
Larsen Products Corp.	633	M-4
La Salle Steel Co.	208	B-5
The F. H. Lawson Co.	426	L-1
Lawter Chemicals, Inc.	1067	U-10
Walter G. Legge Co., Inc.	406	G-1
Leslie Co.	470	U-1
G. B. Lewis Co.	766	T-5

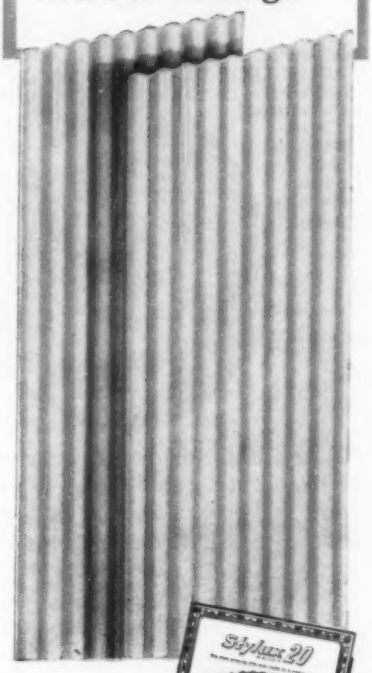
Turn the page

LOOK FOR THE

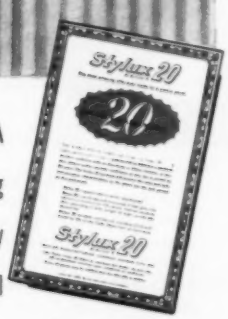
Stylux 20 BY BUTLER

GUARANTEE

...it's in writing!



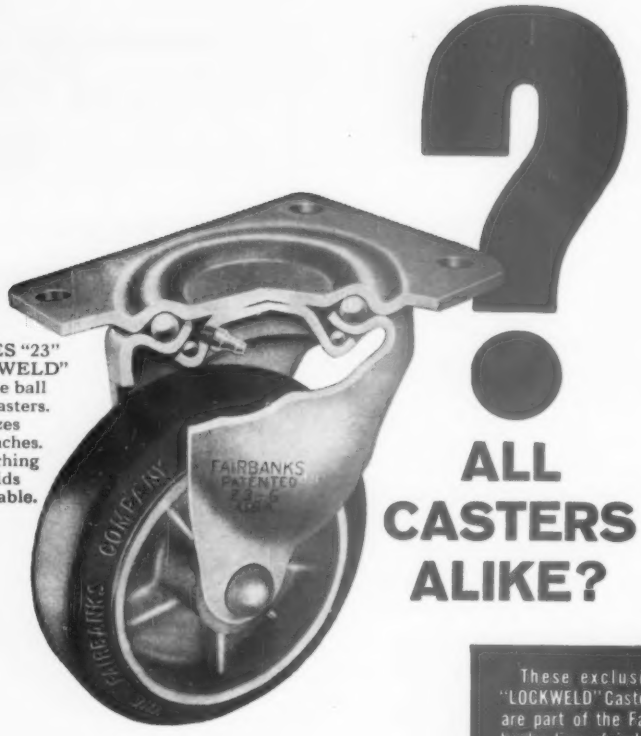
A Guarantee Tag on Every Panel



A Written Guarantee with Every Purchase

Stylux 20 BY BUTLER

PLASTICS DEPARTMENT
BUTLER MANUFACTURING COMPANY
Dept. 110, 7400 East 13th Street, Kansas City 26, Mo.



SERIES "23" "LOCKWELD" double ball race casters. Sizes 3-8 inches. Matching rigids available.

? ALL CASTERS ALIKE?

SERIES "21"
"LOCKWELD" single ball race casters. Sizes 2-6 inches.

Fairbanks "LOCKWELD" Steel Swivel Casters are the different casters—the casters without a king-pin—the casters without the major cause of caster failures. The unique "LOCKWELD" Construction will cut your maintenance and replacement costs—bring big savings to you.

Fairbanks patented "LOCKWELD" Steel Casters — in single ball race, regular duty, and double ball race, medium-heavy duty construction — have substituted a rugged welded structure for the king-pin assembly. Inherently stronger, and locking the ball raceways in rigid alignment, this construction provides casters that last longer, swivel easier, and end your swivel caster maintenance problems.

Another patented feature of Fairbanks "LOCKWELD" Steel Casters is the spherical leg design. Based on the stress dispersing qualities of a true sphere, this leg design disperses shocks and overloads over a greater portion of the ball race, providing for easier swiveling under load and materially increasing the strength and service life of the casters.

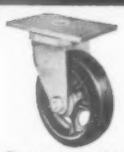
Buy Through Distributors. Fairbanks products are stocked, sold and recommended by leading distributors in all the principal cities across the nation.

THE **Fairbanks** COMPANY

Executive Office: 393 Lafayette St., New York 3, N. Y.
Valves • Dart Unions • Casters • Trucks • Wheels
520 Atlantic Ave., Boston 10, Mass.
2600 S. Throop St., Chicago 8, Ill.
393 Lafayette St., New York 3, N. Y.
15 Stanwix St., Pittsburgh 22, Pa.
202 Division St., Rome, Ga.
Factories — Binghamton, N. Y. and Rome, Ga.

These exclusive "LOCKWELD" Casters are part of the Fairbanks line of industrial casters and wheels which includes heavy duty, completely hardened, steel casters; trailer casters and semi-steel casters; Fairbanks guaranteed vulcanized rubber tired wheels; Fairbanks "LAMILON" All-Plastic (patent pending) wheels and solid rubber and semi-steel wheels.

SERIES "27"



Heavy Duty, completely hardened casters, sizes 6, 8 and 10 inch.

SERIES "500"

Guaranteed Vulcanized Rubber Tired Wheels, sizes 3-18 inches.

SERIES "700"

"LAMILON" All-Plastic (patent pending) Wheels, sizes 3-12 inches.

GUIDE TO EXHIBITORS

Begins on page 123

EXHIBITOR	BOOTH	MAP
Lift-A-Loft Co.	773	U-6
Lincoln Engineering Co.	804	G-6
Lubriquipment Engineers	206	B-5
The Lug-All Co.	1007	G-10
The Lunkenheimer Co.	830	M-6

M

Machine Design	419	I-2
Maco Industries, Inc.	656	R-3
Magnaflux Corp.	307	D-3
Maintenance Magazine	590	W-3
Maintenance Products, Inc.	1011	H-10
Manheim Mfg. & Belting Co.	438	N-1
Manpower, Inc.	765	T-6
Markal Co.	674	V-3
Market Forge Co.	558	R-2
Martin Engineering Co.	1009	G-10
The Martindale Electric Co.	526	L-2
Marvel Lamp Co.	640	N-4
Master Builders Co., Div. of American-Marietta Co.	912	H-8
The Master Mechanics Co.	965	T-9
McGill Mfg. Co., Inc.	606	F-4
Metal-Cladding, Inc.	591	W-3
Metal Lubricants Co.	849	Q-7
Midland Pipe and Supply Co.	554	Q-2
Mighty Mover Co.	202	B-5
Mill & Factory Magazine	121	B-8
Millers Falls Co.	868	T-7
Milwaukee Electric Tool Corp.	958	S-8
Mobil Oil Co.	741	O-6
Motorola Communications & Electronics, Inc.	905	F-9
Multi-Clean Products, Inc.	604	F-4

N

National Assn. of Lighting Maintenance Contractors	651	Q-4
National Chemsearch Corp.	574	V-2
National Electrical Contractors Assn.	464	T-1
National Heater Co., Inc.	657	R-4
National Vulcanized Fibre Co.	832	N-6
The National Super Service Co.	865	T-7
New Equipment Digest	419	I-2
New Hermes Engraving Machine Corp.	1041	O-10
Nye Tool Co.	1045	P-10

O

Oakite Products, Inc.	505	F-3
Oberdorfer Foundries, Inc.	761	S-6
O'Brien Mfg. Corp.	407	G-2
The Ohio Carbon Co.	439	N-2
The Ore-Lube Corp.	639	N-4
The Oster Mfg. Co.	705	F-6
Oxy-Catalyst, Inc.	769	U-6

P

G. H. Packwood Mfg. Co.	418	I-1
Parker-Hannifin Corp.	109	B-5
Parker Sweeper Co.	529	M-3

Turn the page

Only C-L-X®
Continuous Lightweight aXterior

Sealed Cable Systems by Simplex Can do so Many Jobs so Well

Simplex C-L-X is a packaged combination of cable and an extremely pliable, corrugated metal sheath. It requires no separate duct or conduit regardless of environment. It is available with steel sheath and plastic jacketing; and with copper or aluminum sheaths, with or without plastic jacketing.

C-L-X Cuts Installation Costs

By using a single length of 3-conductor 15KV C-L-X for both underground and aerial use, a Southeastern utility company saved more than 20,000 dollars from what it would have cost for a complete underground duct system.

Resists Chemical Attack

Conduit life in this company's calcium chloride reclamation building was only 6 to 9 months. The conduit was replaced with a C-L-X cable system which — after two years of operation, shows no signs of deterioration.

Protects Against Liquids and Gases

An East Coast petroleum tank farm used a C-L-X 8-conductor cable protected with PVC for direct burial in ground that was saturated with oil, gas and water. Result: Perfect performance at a sizeable savings over conduit systems.

Only Simplex C-L-X offers you: Exceptional Strength . . . Unequalled Pliability . . . Protection from Liquids and Gases . . . Faster Installation and Lower Costs. Send for Illustrated Brochure containing Application and Engineering Data.

SIMPLEX WIRE & CABLE Co.

CAMBRIDGE, MASSACHUSETTS

WEDGMOUNT LEVELING MACHINERY MOUNTS

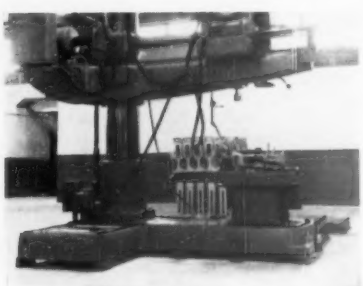
You can now effectively dampen and isolate the vibration, shock and noise of any machine with Wedgmount machinery mounts.

Wedgmounts are manufactured in a wide range of sizes and capacities so that it is possible to control the vibration of any type of machine tool — from punch press to grinder.

Wedgmounts are installed without bolts or cement and installation takes but a matter of minutes. Because of their opposing wedge construction, Wedgmounts are easily leveled by means of an adjusting bolt — no need for shimming.

Other models, retaining the leveling feature, are available to use where bolting to the floor is mandatory, or where it is desired to make the mount an integral part of the machine.

Write for full information about Wedgmount leveling machinery mounts. Or, plan to stop in at our booth at the Plant Maintenance and Engineering Show, Chicago, Jan. 23 — 26, 1961.



* The photograph above is from an actual Wedgmount installation. It is one of eight 4" x 8" Type S Wedgmounts supporting a Cincinnati-Bickford 6 foot radial drill, shown at left.

Air-Loc® DIVISION

Clark, Cutler, McDermott Co.

105 WEST CENTRAL ST. · FRANKLIN, MASS.

GUIDE TO EXHIBITORS . . .

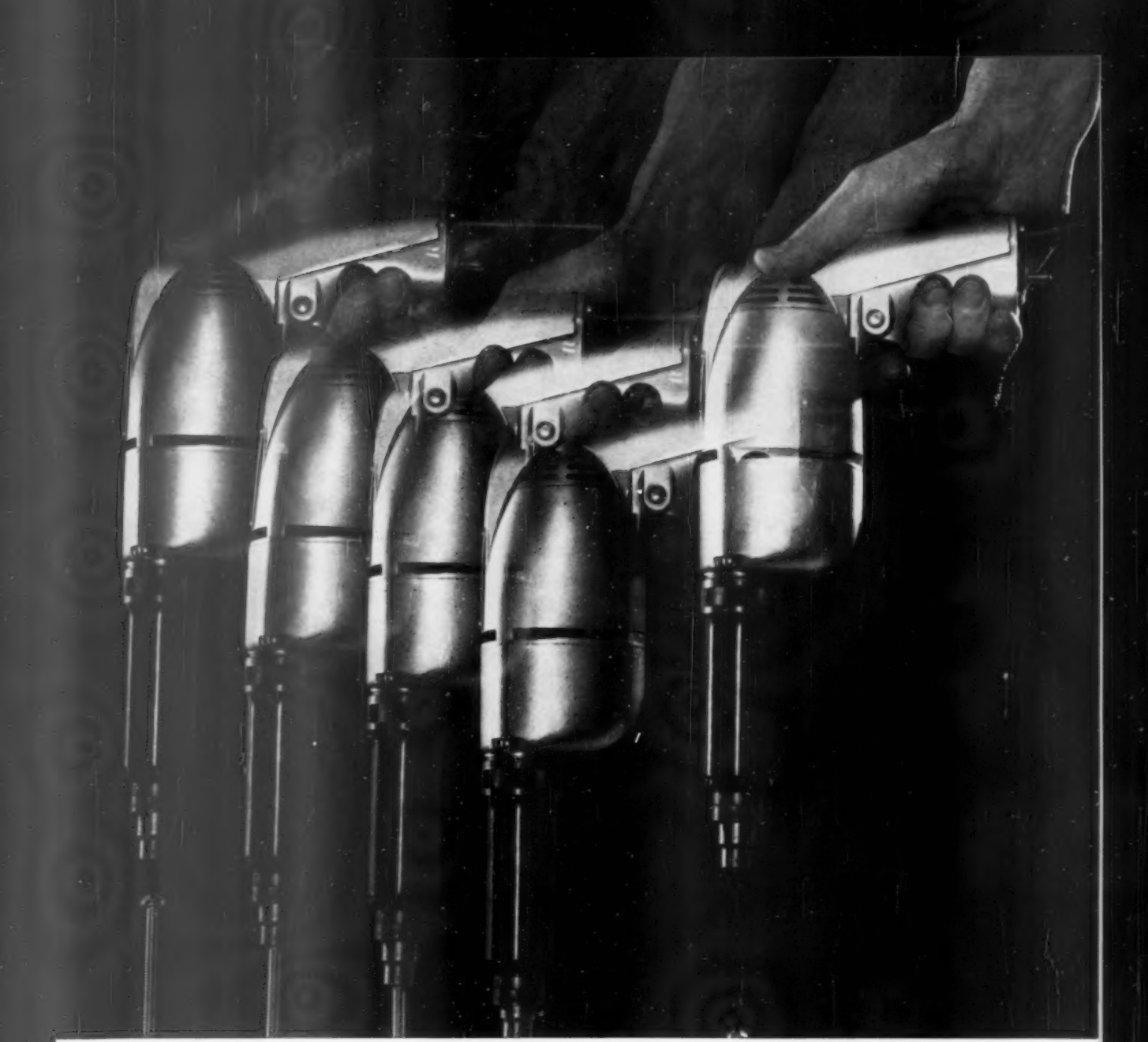
Begins on page 123

EXHIBITOR	BOOTH	MAP
The Patent Scaffolding Co.	901	E-9
The Peele Co.	970	U-8
Pennsalt Chemicals Corp.	777	V-6
Penton Publishing Co.	419	I-2
Permacel	578	V-2
Permagile Corp. of America	666	T-3
Permatex Co., Inc.	424	K-1
Philco Corp.	1030	N-9
Phillips Drill Co.	1000	E-9
Pittsburgh Corning Corp.	746	P-5
Plant Engineering	601	E-4
Plant Publishing Co.	537	N-3
Porter-Cable Machine Co.	539	N-3
H. K. Porter, Inc.	876	V-6
The Protectoseal Co.	911	G-9
Proto Tool Co.	749	Q-6
Punch-Lok Co.	626	L-4
Purchasing	121	B-8
PurOlator Products, Inc.	545	P-3
Putnam Rolling Ladder Co.	1013	H-10
Q		
Quaker Maintenance Co., Inc.	1078	V-9
R		
Radiant Lamp Corp	655	R-4
Ramset Fastening System	522	K-2
The Rapids-Standard Co.	331	D-10
The Rawlplug Co., Inc.	924	L-8
Raybestos-Manhattan, Inc.	459	S-2
Ready Cool, Inc.	490	W-1
Remington Rand Systems, Div. of Sperry Rand Corp.	815	I-7
Reynolds Metals Co.	658	S-4
Reynolds Televator Corp.	668	T-4
J. A. Richards Co.	448	P-1
The Ridge Tool Co.	801	E-7
Robvon Backing Ring Co.	1053	Q-10
Rockwood Sprinkler Div., Gamewell Co.	108	A-5
Rohm & Haas Co.	645	P-4
The Roll-On Mfg. Corp.	1059	R-10
Rome Cable Div. of Alcoa	805	F-7
Ronningen Petter Co.	567	T-3
Rotherm Engineering Co.	1035	N-10
Royal Metal Mfg. Co.	835	N-7
Rust-Oleum Corp.	742	O-5
Ruud Mfg. Co.	778	V-5
S		
Safway Steel Products, Inc.	923	K-9
Schoelkopf Mfg. Co.	1056	R-9
Sellers Injector Corp.	1005	F-10
Shell Oil Co.	922	K-8
Sileps, Inc.	572	U-2
Simoniz Co.	415	H-2
Simplex Wire & Cable Co.	673	V-4
Skil Corp.	900	E-8
A. O. Smith Corp.	409	G-2
Smith-Blair, Inc.	652	Q-4
Southern Mfg. Co.	1024	L-9
Spartan Tool Div. of Conco Engineering Works	204	B-4
Spectra-Glaze, The Burns & Russell Co.	1047	P-10
The Spencer Turbine Co.	1006	F-9

Turn the page

For more facts Circle 452 on Reader Service Card

For more facts Circle 453 on Reader Service Card ➤



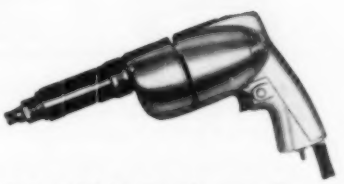
Exact Tension—500 screws or 500,000!

New Skil Anti-Ratcheting Driver rules out rejects

Set the torque on this driver for *any* assembly job and it'll stop driving completely the instant exact tension is reached.

A half million drives later you still get exact tension every time—never a stripped thread or damaged part, never a chance of costly rejects. And since torque control is not dependent on operator's skill, even beginners get the same fast, uniform results as experienced workers.

Drivers simply don't come any faster, any quieter, any better! Your Skil distributor has the proof. Ask him for a demonstration of either Model 235 (standard) or 272 (reversing). He's listed in the Yellow Pages under "Tools-Electric". Or write: Skil Corporation, Dept. 117A, 5033 Elston Avenue, Chicago 30, Illinois. In Canada: 3601 Dundas Street West, Toronto 9, Ontario.



Both models handle wide range of screwdriving and nut running jobs. Reversing model also does fast disassembly work.

SKIL ... and SKILSAW POWER TOOLS

SEE NEW SKIL TOOLS • BOOTH 900 • PLANT MAINTENANCE SHOW

Cut costs, save time with B&D accessories

Regardless of whether you're interested in wet or dry pick-up, you'll find B&D-designed accessories equip your unit with the versatility needed to finish the job ahead of schedule.

STANDARD ATTACHMENTS feature a full line of ruggedly built brushes, squeegees, nozzles, straight and curved extensions for wet or dry pick-up.

LIGHTWEIGHT COMMERCIAL ATTACHMENTS include handsomely-designed floor and dust brushes, upholstery and drapery nozzles, and extension tubes.

HEAVY-DUTY ATTACHMENTS offer you a longer-lasting quality line for wet and dry pick-up.

Your local B&D distributor has them all. Give him a call today!

Black & Decker
ACCESSORIES DESIGNED FOR THE TOOL

EXHIBITOR	BOOTH	MAP
Standard Dry Wall Products	423	K-2
Standard Industrial Products Co.	1014	H-9
Standard Pressed Steel Co.	711	G-6
Stanley Electric Tools, Div. of The Stanley Works	1028	M-9
Magic Door Sales, Div. of The Stanley Works	470	U-1
Star Expansion Industries Corp.	610	G-4
Steel	419	I-2
Steel Sash Service, Inc.	932	N-8
Steiner Co.	514	H-2
Sterling Fleischman Co.	1017	I-10
Stewart-Warner Corp.	560	S-2
Stockham Valves & Fittings	750	Q-5
Stokvis Multiton Corp.	926	M-8
Strong, Carlisle & Hammond, White Sewing Machine	450	Q-1
Structoglas, Inc.	712	H-5
Sugar Beet Products Co.	809	G-7
Sundure Paint Corp.	107	B-4
Sunroc Corp.	928	M-8
Sweet's Catalog Service, F. W. Dodge Corp.	532	M-2
Swift & Co., General Adhesive Products Dept.	1008	G-9
Switzer Brothers, Inc.	1012	H-9
Swivelier Co., Inc.	1010	G-9
Sylvania Lighting Products	622	K-4

T

S. G. Taylor Chain Co., Inc.	672	U-4
Templeton, Kenly & Co.	201	C-2
G. H. Tennant Co.	719	I-6
Thomas Flexible Coupling Co.	920	I-8
Thomas Publishing Co.	925	L-9
Thomas' Register of American Manufacturers	925	L-9
Titeflex, Inc.	726	L-5
Toledo Pipe Threading Machine Co.	523	K-3
The Tool & Mfg. Co., Inc.	317	D-7
Tranter Mfg. Co., Inc.	814	H-6
Tropical Paint Co.	535	M-3
Truscon Laboratories	565	T-3
Turco Products, Inc.	623	K-4

U

Union Wire Rope Corp.	416	H-1
Unisorb, Div. of Felters Co.	1023	K-10
United States Borax & Chemical Corp.	576	V-2
U. S. Expansion Bolt Co.	638	N-4
Upright Scaffolds, Div. of Up-Right, Inc.	600	E-4

V

Vaco Products Co.	558	R-2
Vac-U-Max	101	B-2
Valdura Div. of American-Marietta Co.	916	I-8
Van Products Co.	917	I-9
Vanton Pump & Equipment Corp.	878	V-6
Vibro-Plus Products, Inc.	977	V-9
Victualic Co. of America	1055	R-10
Visirecord, Inc.	692	W-4

W

B. E. Wallace Products Corp.	1066	T-9
Walworth Co.	441	O-2
Wandell Machine Co.	404	F-1
Wayne Mfg. Co.	841	O-7
The Weatherhead Co.	1004	F-9
Weber Marking Systems, Inc.	1026	M-9
Wells Mfg. Corp.	615	H-4
West Chemical Products, Inc.	508	G-2
Western Industries, Inc.	431	M-2
Westinghouse Electric Corp.	723	E-6
Westinghouse Electric Corp. Water Cooler & Dehumidifier Dept.	506	G-2
Westline Products Div. of Western Lithograph Co.	512	H-2
Wheelabrator Corp.	1016	I-9
Wheeler Mfg. Corp.	890	W-6
Wheel Trueing Tool Co.	866	T-6
White Mop Wringer Co.	471	U-2
Edwin L. Wiegand Co.	951	Q-9
The Wilbur & Williams Co.	321	D-8
The Wiremold Co.	465	T-2
Witch Marketing Co.	469	U-2
The Witt Cornice Co.	550	P-2
Woodbridge Ornamental Iron Co.	422	J-1
Wooster Products Inc.	1029	M-10

Y

The Yale & Towne Mfg. Co.	845	P-7
Yarnall-Waring Co.	665	T-4

Tank recalibration

Dents in a tank of liquid will change its capacity. So will bottom flexing. These capacity changes necessitate the periodic recalibration of tank volumes in processing industries if inventory control in handling and storing liquids is to be effective.

Until now, recalibration procedures have involved laborious measurements of tank dimensions and the use of complex formulas.

Now, metering makes recalibration simpler and more accurate. One such method employs a mobile unit (two steel skid-mounted packages placed on a flat-bed truck) built around calibrated meters and a simple but flexible valving set-up.

One package is the power unit. The second package consists of the meters, valves, and piping.

The tank to be calibrated is emptied, except for vapors, and connected to the discharge side of the meters. Then the liquid used for calibrating is circulated inside the unit and the new capacity is found by using the meter readings.

Circle 455 on Reader Service Card for items on next page

There's NINE in the LINE!

New B&D Heavy-Duty Industrial Vacuum Cleaner Line is longer, offers more power for all-purpose pick-up!

Dirt, wet or dry. Clean it up faster in the factory, furnace room or boardroom . . . with Black & Decker's new line of nine heavy-duty vacuum cleaners. They have pick-up power to spare, mobility to go anywhere. Greater choice of capacities, too . . . ranging from ¼ bushel to 40 gallons.

Redesigned tank inlets for increased intake, convenient wet-disposal outlets (on all new stainless models), modern attachments . . . all this you'll find in B&D's new line of nine at your B&D distributor. For further information on how B&D Vacuum Cleaners can help *you* keep clean, send for your copy of "The Inside Story on a Dirty Business." *For sales or service, look in the Yellow Pages of the telephone book under . . .*

TOOLS ELECTRIC

Black & Decker®

CUTS MAN-HOURS TO MINUTES

Up or *down*, the versatile No. 25 is a heavy-duty lightweight that makes light work of every cleaning job . . . quietly.

Scoop up metal chips, clean up wet, slippery floors with B&D's new stainless No. 65. Low tank outlet for easy wet-disposal.

THE BLACK & DECKER MFG. CO. Dept. 0701
Towson 4, Md. (In Canada: Brockville, Ont.)

☐ Please arrange a demonstration of the B&D Vacuum Cleaner line

☐ Please send free copy of "The Inside Story on a Dirty Business"

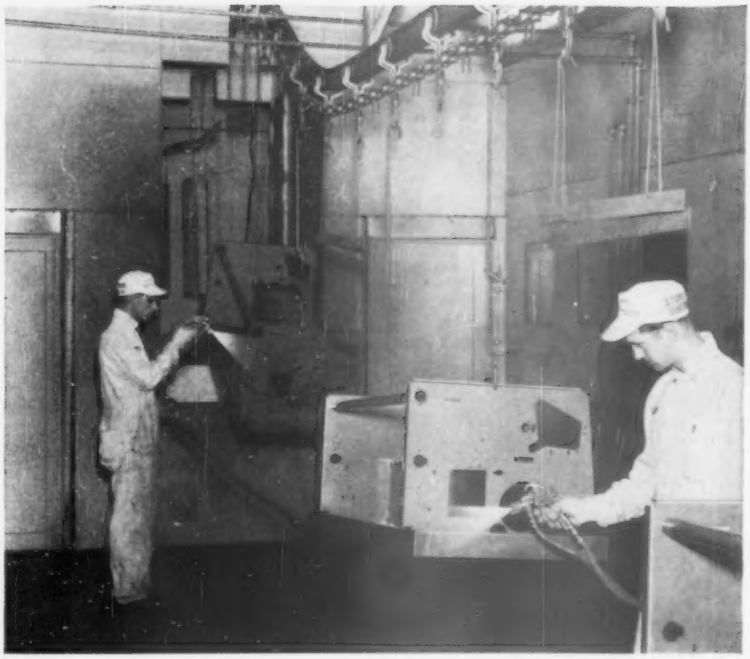
Name.....Title.....

Company.....

Address.....

City.....Zone.....State.....

☐ Drills ☐ Grinders ☐ Scrubguns® ☐ Hammers



In the new Charles Bruning Co., plant...

a finishing department where efficiency is king

In equipping their new plant in Mount Prospect, Illinois, Bruning took full advantage of the opportunity to build new efficiencies into every manufacturing step.

Working closely with Bruning engineers, Binks designed a spray finishing system in keeping with every other advanced process incorporated into the plant.

The finishing system is completely flexible! The combination of conveyorized handling and manual spraying accommodates any product size, in any sequence. Each model color is readily available to the painters ...and with efficient overspray removal provided by the spray booth exhaust system, several colors can be sprayed simultaneously without fear of drift. Air entering the spray booth is filtered and the volume is greater than the air exhausted. This keeps the painting area completely free of dust and improves finishing quality. Health and housekeeping standards are also high.

Free planning service

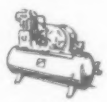
During the past 65 years, Binks has designed and installed finishing equipment for thousands of companies, painting and coating countless products. This experience plus a complete line of finishing equipment is available for application to your needs. It doesn't cost a penny to talk to a Binks engineer...it may save you thousands of dollars.

BINKS BOOTH NO. 753, National Plant Maintenance and Engineering Show International Amphitheatre, Chicago, Illinois, January 23-26, 1961

0700

Binks
EVERYTHING FOR
SPRAY PAINTING

SPRAY GUNS


AIR COMPRESSORS

NATIONWIDE SERVICE

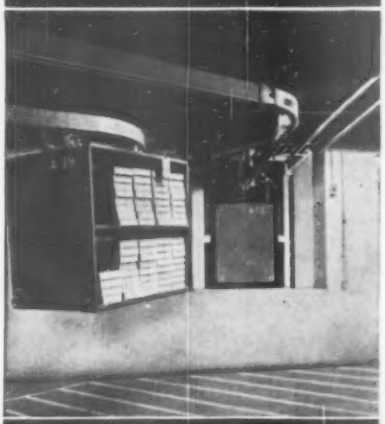
Binks Manufacturing Company
3146 West Carroll Ave., Chicago 12, Illinois

REPRESENTATIVES IN PRINCIPAL U.S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY

For more facts Circle 456 on Reader Service Card

Power-Flex®

POWER AND FREE OVERHEAD CONVEYOR SYSTEM*



WITH TELEMATIC AUTOMATIC DISPATCH CONTROL

• Simply set dials and Telematic guides carrier to any station in system

Employs exclusive unitized "over and under" power and free rail which permits simple switching to right or left as desired.

Power-Flex is designed for automated materials forwarding applications in industrial plants, distribution centers, service buildings and department stores. The most economical system available for loads up to 600 lbs. per carrier. Savings in actual installations range from 25% to 60%.

*Systems in service for your inspection.

Engineered to your very specific requirements.

SEND FOR BROCHURE

Inquiries from your engineers or consultants welcomed.

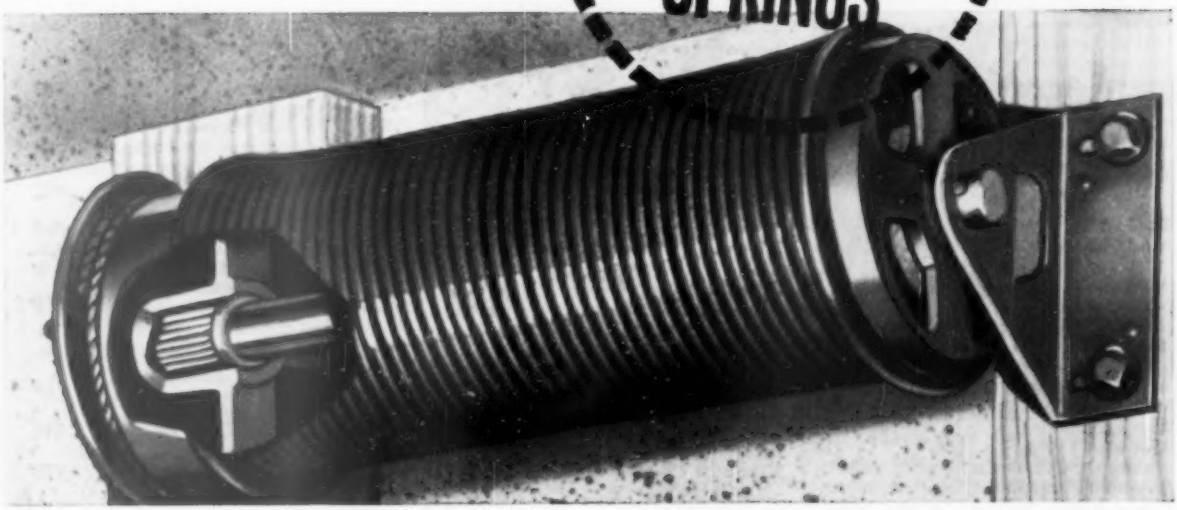
CM® CONVEYORS

COLUMBUS McKINNON CORPORATION
Conveyor Division
TONAWANDA, N.Y.

Circle 510 on Reader Service Card

Another feature guaranteeing trouble-free, maintenance-free, and cost-free performance:

Barber-Colman 100,000 CYCLE SPRINGS



Plant and warehouse doors are much more than just "doors"—they are a basic factor in the materials-handling cycle. When doors fail production slows down or stops.

Barber-Colman OVERdoor helps protect profits with 100,000 cycle torsion springs which can be furnished for any standard overhead-type door. The durability and flawless performance you must have every hour, every day, is unconditionally guaranteed.

These 100,000 cycle springs are designed for a minimum life four to five times that of ordinary equipment and are a basic part of the most rugged, long-life door construction you can possibly specify. Yes—there is a Big Difference in Barber-Colman OVERdoors. Your OVERdoor specialist is trained to appraise door requirements and help you plan for maximum materials-handling efficiencies.

THE MARK OF QUALITY
BARBER COLMAN

BARBER-COLMAN COMPANY
Dept. AF11, Rockford, Illinois

PRODUCTS EXHIBITED AT THE SHOW

PRODUCT — **BOOTH**

ALARM, FIRE, AND COMMUNICATION SYSTEMS

American District Telegraph Co. 1062
Fire and burglar alarm systems.

Kenco Pump Div., American Crucible Products Co. 941
Liquid level alarm system.

Walter Kidde & Co., Inc. 131
Dry-chemical, carbon-dioxide, pressurized-water, anti-freeze extinguishers.

Motorola Communications & Electronics, Inc. 905
Radio for fork-lift trucks, two-way radios, portable radiophones, closed circuit television.

BUILDING CONSTRUCTION MATERIALS

Acme Steel Co., Fabricated Materials Div. 722
Reinforcing for concrete floors.

Alan Wood Steel Co. 908
Abrasive rolled steel flooring.

American Floor Products Co. 1036
Non-slip floor coverings, stair treads, mats and matting.

American Vamag Co., Inc. 116
Concrete and mortar bonding additive, fireproofing compound, concrete impregnating agent, building exterior waterproofing compound.

Barber-Colman Co. 203
Cam action overhead doors and electric door operators.

Best Universal Lock Co., Inc. 451
Architectural hardware and door trim.

Burns & Russell Co. 1047
Glazed concrete masonry block, acoustical masonry unit.

Butler Mfg. Co. 654
Reinforced plastic panels.

Philip Carey Mfg. Co. 702
Roofing, siding, insulation; insulating cements.

Clark Door Co., Inc. 1061
Electric- and air-operated automatic doors, impact doors.

Globe Co., Products Div. 336
Floor safety grating.

H. A. Harry Glass Co. 670
Continuous hinged, top-hung sash.

Hastings Pavement Co., Inc. 957
Asphalt blocks.

A. C. Horn Co. 647
Expansion joint compound.

Industrial Acoustics Co. 1039
Soundproof telephone booths, mufflers, acoustic materials, and doors.

Kalman Floor Co. 641
Concrete, epoxy, and bactericidal floors and toppings.

Korfund Co., Inc. 501
Acoustical panels and ducts.

Larsen Products Corp. 633
Bonding agent for concrete.

Maintenance Products, Inc. 1011
Building joint sealant*.

Master Builders Co., Div. of American-Marietta Co. 912
Floor hardeners, grouting materials, pre-mixed mortar, water-reducing admixture for concrete, color for concrete floors, mortarproofing.

Pennsalt Chemicals Corp. 777
Floor surfacing compound and acid-proof cement.

Permagile Corp. of America 666
Sealers for concrete, metals, glass, and floors.

Pittsburgh Corning Corp. 746
Glass blocks.

Rohm & Haas Co. 645
Plastic glazing materials.

Schoelkopf Mfg. Co., Inc. 1056
Sliding and swing door operators, door track and accessories.

Tropical Paint Co. 535
Concrete bonding agent.

BUILDING REPAIR MATERIALS

Fibre Glass-Evercoat Co., Inc. 453
Floor patching compound, plastic putty.

A. C. Horn Co. 647
Floor topping and patching compound.

Larsen Products Corp. 633
Concrete patching compound*.

Maintenance Products, Inc. 1011
Roof repair coatings, pavement crack filler, pavement sealer*.

Standard Dry Wall Products, Inc. 423
Wall patching and cleaning material.

CLEANING EQUIPMENT AND SUPPLIES—FLOORS

American-Lincoln Corp. 214
Floor scrubbers, polishers, waxers; wet and dry pick-up vacuum cleaners.

Black & Decker Mfg. Co. 1065
Vacuum cleaners* and accessories*.

Breuer Electric Mfg. Co. 946
Floor maintenance machines.

Clarke Floor Machine Co., Div. of Studebaker-Packard Corp. 607
Power sweeper*, floor scrubber-vacuum.

Doyle Vacuum Cleaner Co. 445
Floor polishing & scrubbing machines, wet or dry recovery vacuum cleaners.

Eagle-Picher Co. 603
Absorbent for liquid spillage.

Finnell System, Inc. 823
Floor maintenance equipment, supplies.

Geerpres Wringer, Inc. 536
Floor cleaning equipment.

Hild Floor Machine Co., Inc. 919
Vacuum cleaners: conventional and explosion-proof; floor polishing and scrubbing machines.

Hydra-Action Co. 566
Rider-type power sweeper.

Industrial Wiping Cloth Co., Inc. 842
Dust mop*.

S. C. Johnson & Son, Inc. 619
Wax remover.

Lambert Inc. 1031
Industrial floor sweeper*.

Market Forge Co. 558
Mop buckets*, bucket trucks, mopping combinations* and sets.

Multi-Clean Products, Inc. 604
Floor polishing and scrubbing machine, wet or dry pick-up vacuum, waxes, cleaners, and detergents.

G. H. Packwood Mfg. Co. 418
Floor cleaners.

Parker Sweeper Co. 529
Floor sweepers.

Rust-Oleum Corp. 742
Floor cleaner.

Simoniz Co. 415
Floor cleaner, wax, and finish.

G. H. Tennant Co. 719
Power sweepers and floor maintenance machines.

Wayne Mfg. Co. 841
Power sweepers.

Turn to page 141

* *Shown for the first time*

INDEX TO OTHER PRODUCT LISTINGS

Cleaning Equipment and Supplies—General....141
Electrical Equipment, Parts, and Supplies....143
Furniture and Storage Equipment....143
Health and Safety Equipment and Supplies....143
Heating, Ventilating, and Air-Cleaning Units....147
Instruments for Test, Measurement, and Diagnosis....147
Lighting Equipment....148
Lubricants and Lubrication Equipment....148
Materials and Supplies....150
Material-Handling Equipment and Parts....152
Mechanical Power Transmission Equipment....154
Miscellaneous....154
Protective Coatings, Painting Equipment....156
Record and Timing Systems....161
Scaffolds, Ladders, and Platforms....161
Shop Equipment....161
Tools - Hand....162
Tools - Portable Power....166
Utility and Auxiliary Equipment....168
Valves, Piping, Fittings....168
Vibration Mounts....172
Washroom Facilities, Drinking Fountains....172

Self-Powered
COMBINATION SCRUBBER-VAC

Cleans Vast-Area Floors "By the Mile"

Monoxide Eliminator, Powder Dispenser, and Rinse Assembly are accessories

- Completely mechanizes scrubbing
- Coverage up to 24,400 sq. ft. per hour!
- Mounts a SELF-STARTING gasoline engine

This *all-in-one* cleaning unit, *Finnell's 218G Gasoline-Powered Combination Scrubber-Vac,* is indeed the answer to today's need for increasing output per man-hour on vast-area scrubbing. *The 218G completely mechanizes scrubbing* — applies the cleanser, scrubs, flush-rinses if required, and picks up (damp-dries the floor) — *all in one operation!* Independence from power lines permits the machine to go wherever the operator guides it . . . working in and out of production areas with ease . . . *scrubbing continuously.*

Maintenance men appreciate the labor-saving features of this unit. The gasoline engine starts quickly and easily by pressing the starter button. And there are no switches to set for *fast* or *slow* — slight pressure of the hand on clutch lever adjusts speed to desired rate (up to 136 fpm). Two 18-inch brushes give a 36-inch scrubbing surface. *One engine* (2 cyl., 4 cycle, up to 10.1 hp maximum, and air-cooled) operates all working parts. The powerful vac performs quietly.

Whatever the area of your floors, find out what *you* would save with a *Combination Scrubber-Vac. Finnell* makes *self-powered* models — gasoline, propane, and battery operated — for small, vast, and intermediate operations. And of course *Finnell* also makes *electric* models to meet specific needs. It's good to know too that *a Finnell Floor Specialist and Engineer is nearby* to help train your maintenance operators in the proper use of *Finnell Equipment* and to make periodic check-ups. For demonstration, consultation, or literature, phone or write nearest *Finnell Branch* or Finnell System, Inc., 2501 East St., Elkhart, Ind. Branch Offices in all principal cities of the United States and Canada.

FINNELL SYSTEM, INC.

Originators of Power Scrubbing and Polishing Machines

Everything FINNELL for Floor Care

BRANCHES IN ALL PRINCIPAL CITIES

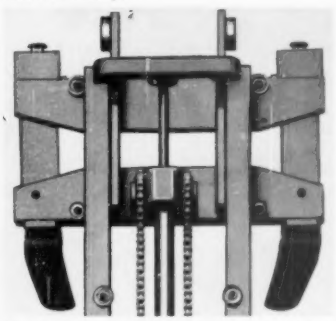
See the Finnell Exhibit • PLANT MAINTENANCE & ENGINEERING SHOW • Chicago • January 23-26 • *Space 823*

For more facts circle 458 on Reader Service Card

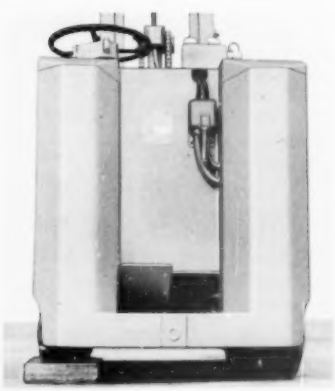
Circle 459 on Reader Service Card for items on next page

Compact K-47 Yale Electrics work in narrow spaces and low headroom areas

Easy battery change—Steering wheel unit pivots on steer shaft to permit hinged battery cover to be raised and detachable side plates to be removed for top or side replacement of battery.



Choice of three masts—Simplex (Yale standard), Duplex and Triplex. K-47 fork carriage permits easy installation of standard hydraulic attachments for specialized requirements.



Stability over uneven surfaces—Pivoted steering axle provides articulation to insure proper contact of all four wheels at all times.

• High lifting speeds • Shortest length for narrow aisle operation • I-beam mast construction provides high rigidity under all load conditions • Capacities 2,000 to 3,000 lbs.

To cut costs in car loading, dock handling and warehousing, consider Yale Electric K-47 Trucks. With fewer wearing parts, electric power reduces maintenance and down-time costs. The trucks are fast, safe, silent. Stand-up end control with low 7-inch step simplifies operator's on-and-off movements. Compactness of design permits truck to operate in minimum aisles with right angle stacking. You'll find exactly the Electric the job requires in Yale's complete line.

START SAVING NOW. Yale has flexible finance plans that will put this electric truck to work for you immediately. For more information see your Yellow Pages for name of nearest distributor. Or write us for his name.

Yale Materials Handling Division, Dept. K101, Phila. 15, Pa., A Division of The Yale & Towne Manufacturing Company

"Only one company can recommend the *right* truck for the application . . . the company that makes them all"

YALE

INDUSTRIAL LIFT TRUCKS
TRACTOR SHOVELS · HOISTS

YALE & TOWNE

T-98
YALE
YALE
YALE
V-8
V-8
V-8
V-8

2 new Penntrowel products for industrial floor surfacing...

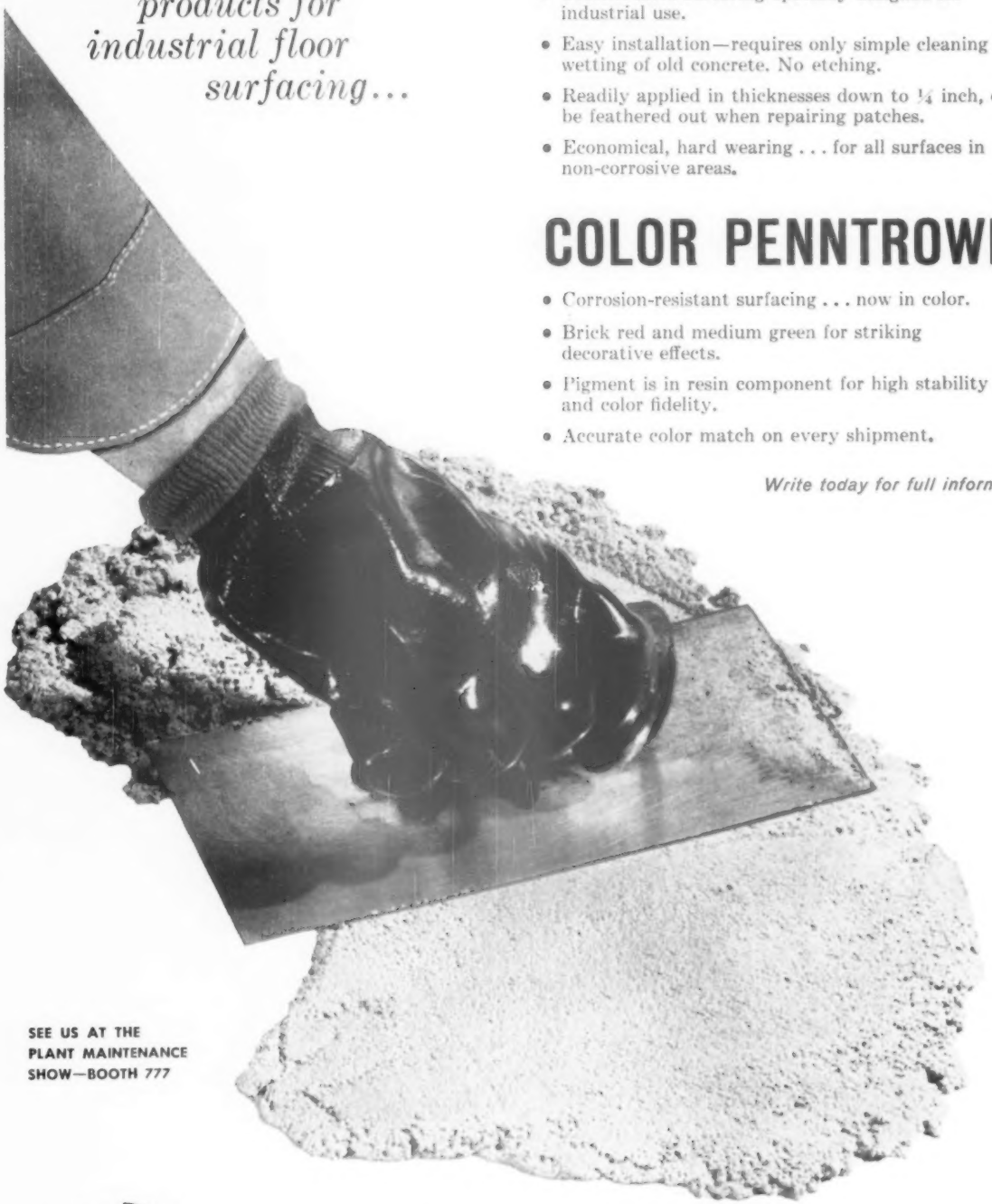
PENNTROWEL® LATEX

- Cement-latex surfacing specially designed for industrial use.
- Easy installation—requires only simple cleaning and wetting of old concrete. No etching.
- Readily applied in thicknesses down to ¼ inch, can be feathered out when repairing patches.
- Economical, hard wearing . . . for all surfaces in non-corrosive areas.

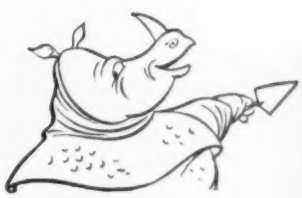
COLOR PENNTROWEL

- Corrosion-resistant surfacing . . . now in color.
- Brick red and medium green for striking decorative effects.
- Pigment is in resin component for high stability and color fidelity.
- Accurate color match on every shipment.

Write today for full information



SEE US AT THE PLANT MAINTENANCE SHOW—BOOTH 777



Penntrowel—Rugged as a Rhino

Pennsalt Chemicals®
ESTABLISHED 1850

Corrosion Engineering Products Dept.
PENNSALT CHEMICALS CORPORATION
Natrona, Pa.

Manufactured in Canada by G. F. Sterne & Sons, Ltd., Brantford, Ontario

For more facts circle 460 on Reader Service Card

PRODUCTS EXHIBITED

Begins on page 136

PRODUCT — **BOOTH**

CLEANING EQUIPMENT AND SUPPLIES—GENERAL

Airkem, Inc. 614
Odor counteractants, disinfectants, detergents, bowl cleaners, insecticides.

American Cleaning Equipment Corp. 569
Industrial vacuums.

Breuer Electric Mfg. Co. 946
Portable, heavy-duty vacuum cleaners.

Brooks Chemicals, Inc. 953
Maintenance and production cleaning, and odor abatement chemicals.

Callaway Mills, Inc. 930
"Kex" National Service
Dust control system, towel rental.

Clements Mfg. Co. 556
Vacuum cleaners* and blower-suction cleaners.

DuBois Chemicals, Inc. 730
Motor cleaning solvents*, cleaning compounds and equipment.

Fence Painter Corp. 519
Cleaning materials, deodorants.

Gray Co., Inc. 935
Maintenance cleaning units.

Homestead Valve Mfg. Co. 1022
Electric high-pressure steam cleaner*.

Ideal Industries, Inc. 511
Vacuum cleaners.

Industrial Wiping Cloth Co., Inc. 842
Lint-free towels, dust mitt*.

S. C. Johnson & Son, Inc. 619
All-purpose cleaner.

Kimberly-Clark Corp. 715
Disposable wipers.

F. H. Lawson Co. 426
Waste receptacles, drum covers, pails.

Walter G. Legge Co., Inc. 406
Floor polish, germicidal cleaner.

Oakite Products, Inc. 505
Spray cleaning system for equipment, walls, and floors; general cleaning, paint stripping, alkaline and acidic descaling and derusting compounds; safety solvent for cleaning electrical equipment; solution-lifting steam guns.

Oster Mfg. Co. 705
Sewer cleaning equipment*.

G. H. Packwood Mfg. Co. 418
Metal cleaners, maintenance cleaners, and degreasers.

Permacel 578
Cleaning cloths.

Permatex Co., Inc. 424
Chrome, glass, fabric, parts cleaners; acrylic cleaner and polish; rust solvent.

Quaker Maintenance Co., Inc. 1078
Wall washing machine, carry-on-back vacuum cleaner*.

Sellers Injector Corp. 1005
Equipment for cleaning outside surfaces, machinery, walls, floors, large and small tank interiors.

Simoniz Co. 415
Synthetic sponge.

Spartan Tool Div., Conco Engineering Works, Inc. 204
Sewer, sink, and soil-line cleaning machines; drain cleaner.

* *Shown for the first time*

Turn the page

Choice of the wise buyer who compares...

CM HOISTS

CM METEOR ELECTRIC WIRE ROPE HOIST ½ to 5 ton capacities—Compact, enclosed design. Low headroom. Continuous duty motor with thermal overload protection for heavy duty service. Precision bearings and helical gears for long life. Only 110 volts at push button control. Hook suspension; plain, geared or motor driven trolley.

CM LODESTAR ELECTRIC CHAIN HOIST—⅛ to 2 ton capacities—First truly heavy duty version of small electric hoist. ¼ ton model weighs only 51 lbs. Heavy duty self-adjusting brake, plus exclusive regenerative electrical braking. Upper-lower safety limit switches. CM-Alloy load chain. Single and three phase.

HAND OR ELECTRIC CHAIN OR WIRE ROPE
CM makes them all! So you can choose a hoist that's perfectly suited to your specific needs in a compact, rugged and safe CM design.
CM TROLLEYS AND CRANES

CM CYCLONE Hand Chain Hoist—¼ to 10 ton capacities—Easy to carry. One ton model weighs only 36 pounds. Made of tough aluminum alloy. CM-Alloy load chain. High efficiency. Lifetime lubrication.

CM PULLER—"The One Man Gang"—¾ to 6 ton capacities—Lifts or pulls at any angle. Lever handle operation Automatic load brake holds at any point. ¾ ton model weighs only 14 pounds and fits in a tool box. CM-Alloy load chain.

● **FOR OVER 75 YEARS,** Chisholm-Moore has offered hoist buyers the newest and most efficient designs, the most rugged construction, and the greatest number of valuable operating and safety features. CM hoists operate with a very minimum of maintenance. They give years of satisfying service.

Request catalog and name of local stocking distributor.

CM HOISTS

CHISHOLM-MOORE HOIST DIVISION
COLUMBUS McKINNON CORPORATION
TONAWANDA, NEW YORK
REGIONAL OFFICES: NEW YORK, CHICAGO, CLEVELAND
In Canada: **COLUMBUS McKINNON LIMITED, ST. CATHARINES, ONTARIO**

For more facts Circle 461 on Reader Service Card

Mr. R. A. Weaver, Electrical Superintendent, Dole Hawaiian Pineapple Company states: **"On the basis of evaluation and comparison with other drives . . .**

We found General Electric Polydyne® Drives best meet our adjustable-speed requirements."

At Dole Hawaiian Pineapple Company's Honolulu Cannery, "Ginaca" processing machines can automatically reduce whole pineapples into separate "components" of core, rind, pulp and a cylinder ready for final processing at a rate of up to 6000 per hour. With a constant-speed motor drive it is necessary to stop and start a Ginaca to control output. However, the Polydyne Drive can match the varying conditions at each stage of the processing system. The adaptability of Polydyne Drives reduces the need for supervisory attention and permits maximum processing efficiency.

Dole Company personnel selected General Electric's Polydyne Drives for the quick and smooth response to speed adjustments demanded by their continuous processing system. As Mr. Weaver also commented, "In our evaluations and comparisons with other drives we gave particular attention to ease of belt replacement because this makes maintenance simple and reduces downtime. We found Polydyne Drives far superior to other drives for making belt changes quickly."

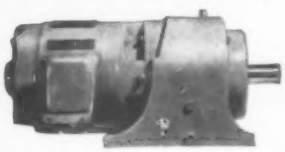
When your application requires low-cost adjustable speed combined with reliability and ease of maintenance, investigate G-E Polydyne Drives. Your General Electric Sales Engineer has full details. Or, write for bulletin GEA-6806, Section 854–05, General Electric Company, Schenectady 5, N. Y.

GENERAL ELECTRIC

GENERAL ELECTRIC OFFERS A *COMPLETE* LINE OF LOW-SPEED DRIVES 1/8 TO 200 HP

Select from G.E.'s PLUS LINE of compact mechanical power transmission equipment! A full range of ratings is available—many directly from stock.

General Electric Polydyne Drive

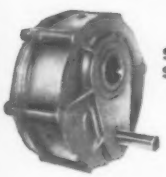


Integral-type Gear Motor

Right-angle Shaft Gear Motor

All-motor Gear Motor

Footed Speed Reducer



Shaft-mounted Speed Reducer

Member of American Gear Manufacturers' Association

GENERAL ELECTRIC

PRODUCTS EXHIBITED AT THE SHOW . . . *Begins on page 136*

Spencer Turbine Co. 1006
Portable vacuum cleaners, central vacuum systems.
Sugar Beet Products Co. 809
General-purpose cleaner and sanitizer-deodorant.
Turco Products, Inc. 623
cleaning compound*, safety solvent.
Vac-U-Max 101
Industrial vacuums.
Witt Cornice Co. 550
Galvanized and stainless steel cans and pails, drum lids, dollies, roller and oily-waste cans.

ELECTRICAL EQUIPMENT, PARTS, AND SUPPLIES

American Pamcor, Inc. 215
Electrical wiring devices and crimping tools.
Anaconda Metal Hose Div., Anaconda American Brass Co. 649
Flexible, liquid-tight conduit.
Appleton Electric Co. 525
Die-cast plugs and receptacles*.
W. M. Bashlin Co. 417
Maintenance holsters, lanyards.
Stewart R. Browne Mfg. Co. 437
Safety equipment, ground clamps.
Buchanan Electrical Products Corp. 691
Pre-insulated splice caps, terminal blocks, connectors and insulators, tools.
Complete-Reading Electric Co., Inc. 1019
Supplies, tools, and instruments for maintenance of electrical equipment.
Electric Materials Co. 653
Commutators, controller parts, bus bar.
Globe Co., Products Div. 336
Basket-, ladder-type cable tray systems.
Helwig Carbon Products, Inc. 436
Carbon and graphite brushes.
Hollywood Plastics, Inc. 432
Electronic parts.
Ideal Industries, Inc. 511
Connectors, conduit, wire strippers, elbows, and commutator maintenance equipment.
Joy Mfg. Co., Electrical Products Div. 325
Safe switches, low-voltage lighting.
Kaiser Aluminum & Chemical Sales 561
Aluminum electrical conduit, aluminum and copper wire and cable.
Kenco Pump Div., American Crucible Products Co. 941
Alternator.
Martindale Electric Co. 526
Electric motor maintenance equipment.
Ohio Carbon Co. 439
Carbon brushes.
Rome Cable Div., Aluminum Co. of America 805
Steel, aluminum, and plastic conduit; wires and cables; copper and aluminum conductors; cable supporting systems.
Simplex Wire & Cable Co. 673
Electrical cords and cables.
Vaco Products Co. 515
Solderless terminals.

* *Shown for the first time*

Westinghouse Electric Corp. 723
A-c and d-c motors and controls, insulation, renewal parts and repair service.
Westline Products Div., Western Lithograph Co. 512
Wire and cable markers, pre-printed tubing, write-on markers.
Wiremold Co. 465
Surface metal raceways, multi-outlet systems, wire connector*.

FURNITURE AND STORAGE EQUIPMENT

Acme Steel Co., Fabricated Materials Div. 722
Heavy-duty storage racks; metal framing for racks, shelving, benches.
Ajusto Equipment Co. 413
Adjustable chairs and stools.
Dexion, Inc. 568
Steel and aluminum slotted angles, open steel planks, panels.
Equipto Div., Aurora Equipment Co. 1091
Steel shelving, slotted angle, drawer units, work benches, trucks.
Protectoseal Co. 911
Safety cans, cabinets for flammables, fusible-link tanks, fittings.
Rapids-Standard Co., Inc. 904
Slotted angle.
Royal Metal Mfg. Co. 835
Shelving, cabinets, files, and stools.
Standard Pressed Steel Co. 711
Double-deck shelving*, benches, storage walls, tool stands, shop desks, stools.

HEALTH AND SAFETY EQUIPMENT AND SUPPLIES

American Abrasive Metals Co. 429
Non-slip compositions and floor paint; cast-iron abrasive, safety stair treads.
W. M. Bashlin Co. 417
Linemen's belts, straps, climbers.
W. H. Brady Co. 1046
Aisle markers; warning stripes, signs.
Eagle Mfg. Co. 509
Plunger, drip, and drain safety cans; galvanized and welded oil and gasoline containers.
Electric Cord Co. 661
Emergency lighting, defense lights.
Laduby Co., Inc. 605
Disposal systems for fluorescent lamps, bottles, jars, and jugs.
Walter G. Legge Co., Inc. 406
Anti-slip floor coating; personnel grounding device.
National Chemsearch Corp. 574
Safety solvent*.
G. H. Packwood Mfg. Co. 418
Granulated and waterless hand cleaners, dispensers.
Rockwood Sprinkler Div., Gamewell Co. 108
Self-contained oxygen breathing unit.
Rohm & Haas Co. 645
Plastic guards.
Shell Oil Co. 922
Fire-resistant hydraulic fluid.

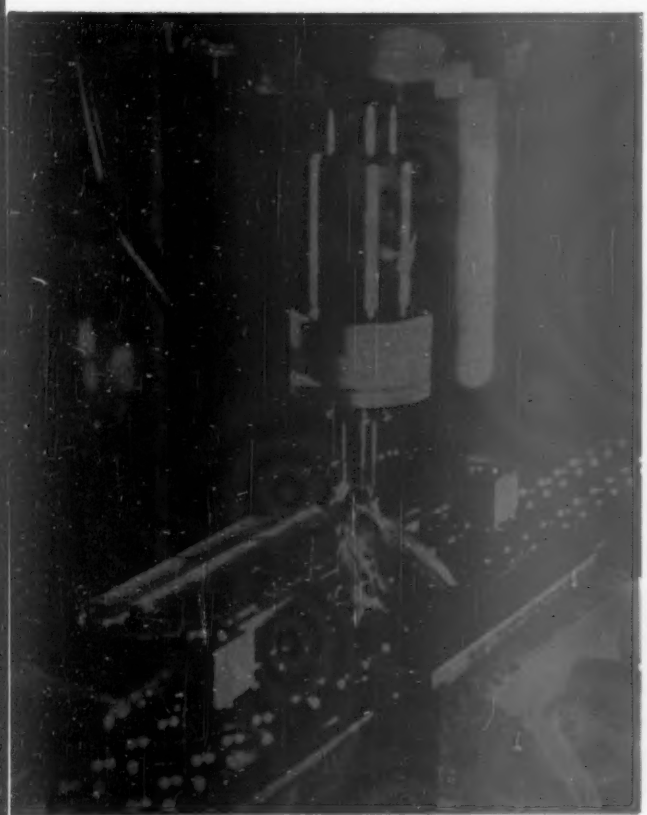
Turn to page 147

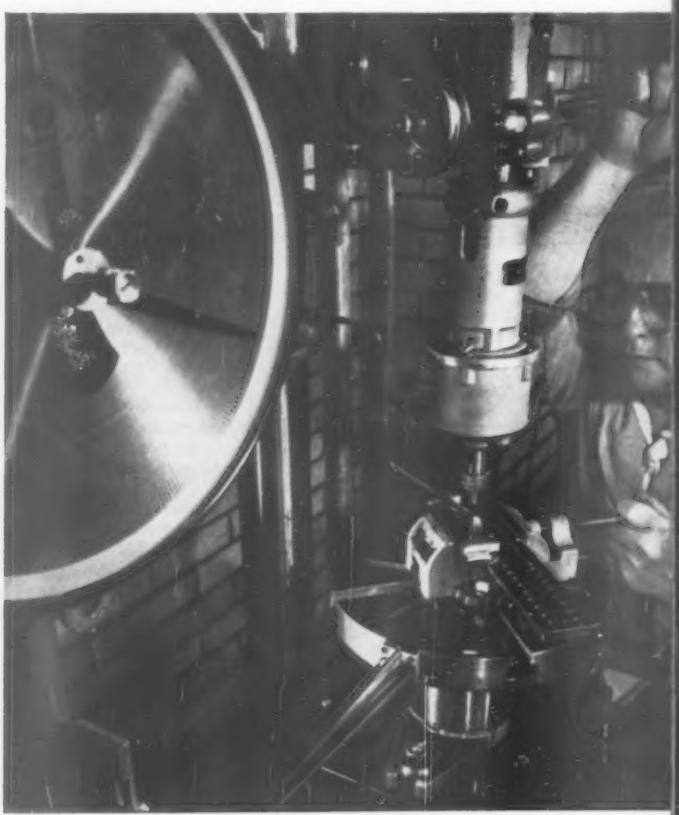
Announcing a major advance

Mobilmet Oils

the first multi-metal cutting fluids...
with unique pressure-temperature selective activity.

This Tapping Efficiency Tester is one of many Mobil research tools used in the development of cutting fluids such as Mobilmet . . . effectively evaluates the machining efficiency of cutting oils on soft, draggy SAE 1020 steel. On this difficult machining operation as well as in field service, Mobilmet oils have demonstrated results better than conventional cutting fluids intended for this application. Other applications for new Mobilmet oils include: Turning, Drilling, Boring, Milling, Gear Hobbing, Shaping and Shaving, Threading, Tapping, Pipe Threading, Surface and Internal Broaching, Thread and Form Grinding, Thread Rolling, Forming and Special Automatic Screw Machine Operations.





in cutting-oil technology...

Now... from Mobil Research... versatile new cutting fluids that offer you: • greater machine output • lower tool costs • reduced loss from rejects... over wide ranges of metals and operations!

Now, after two years of exhaustive research and field testing . . . new Mobilmet* oils—the first multi-metal cutting fluids ever offered to the metalworking industry.

Mobilmet oils are uniquely versatile . . . help simplify your cutting oil requirements because each grade is effective over ranges of metals and operations beyond the capacity of any conventional product. And Mobilmet oils offer you superior machining results as well—in terms of improved finishes, longer tool life, and reduced staining.

Behind this versatility and effectiveness: a new additive composition, developed and patented by Mobil, which is *pressure-temperature selective* in its activity—highly effective over the wide ranges of cutting pressures and temperatures produced in machining various metals with greatly different physical characteristics. As a result, Mobilmet oils are useful for both tough, draggy metals and hard, brittle metals.

Mobil

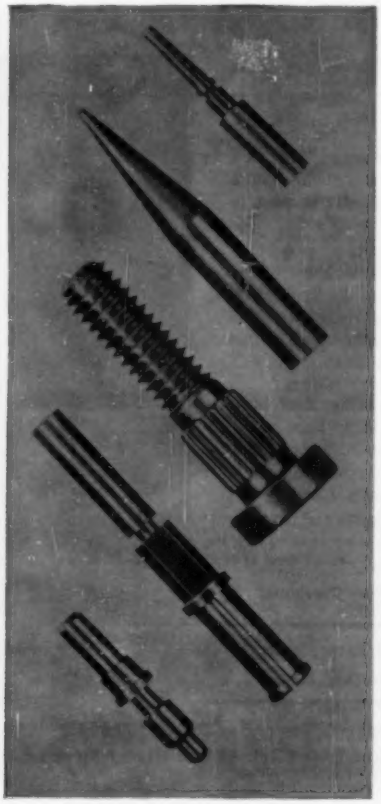
Call your Mobil Representative, or use the coupon below.

*Mobilmet is a trademark of Socony Mobil Oil Company, Inc.

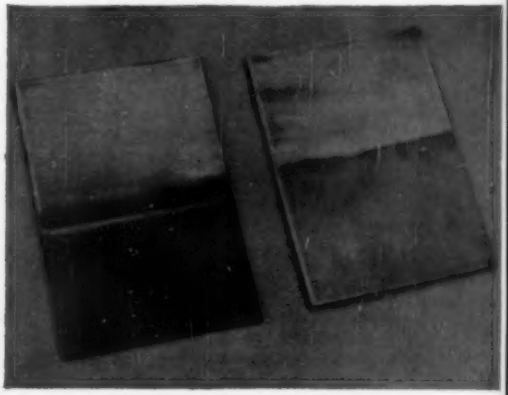
MOBIL OIL COMPANY, 150 East 42nd Street, New York 17, N. Y.

Mobilmet oils offer superior tool life on both soft, draggy metals and hard, clean-cutting materials. These pipe threading chasers used for six weeks in moderately severe job-shop service show little wear on either tool faces or thread crests. Results were achieved with heavy-duty Mobilmet oil.

Since they effectively control built-up edge and tool wear, Mobilmet oils provide superior finishes that meet exacting specifications—with fewer rejects, and in some cases reduced necessity for additional finishing operations.



Stain-inhibiting effect of new additive combination is demonstrated with two steel plates. Plate on the left was immersed in conventional corrosive cutting oil; plate on the right was immersed in heavy-duty Mobilmet grade intended for the same application. Re-polished tops of plates show original condition.



Mobil Oil Company, Room 2057-L
A Division of Socony Mobil Oil Company, Inc.
150 East 42nd Street, New York 17, N. Y.

Gentlemen: I am interested in learning how Mobilmet oils can improve metal-cutting operations at my plant. Contact me about setting up an evaluation program.

*Name*_____

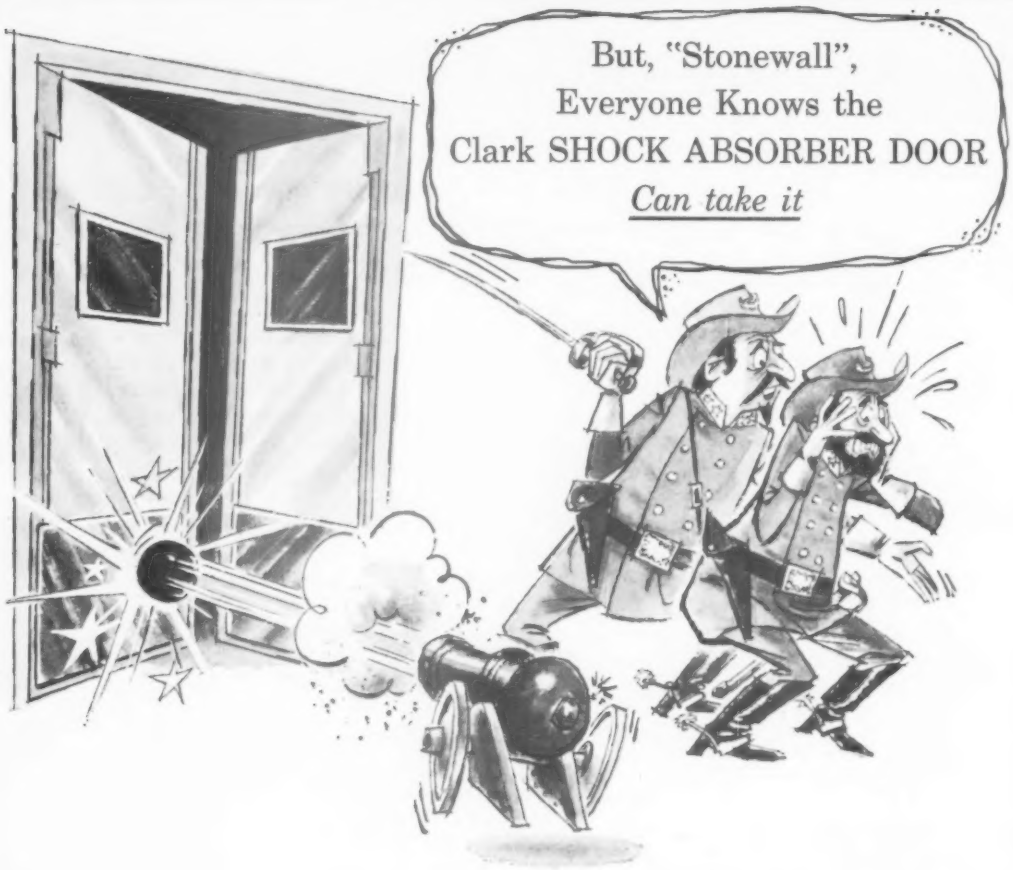
*Position*_____

*Company*_____

*Address*_____

*City*_____ *State*_____

For more facts Circle 463 on Reader Service Card



WON'T RIP, WARP OR COME OFF THE HINGES!

The BUMPER takes the Shock — *Not the DOOR!*

If you move materials, you want an Impact Door that *takes tough treatment.*

The SHOCK ABSORBER DOOR keeps traffic flowing smoothly long after ordinary doors have hollered "Uncle". Constant pounding by heavily laden fork trucks can't weaken the hinges, the frame or the Door itself. Impact is absorbed by Urethane-Foamed Bumpers.

Flexibly suspended, this lightweight, rigid Door opens and closes freely, either manually or when pushed by a truck. In either case, the unique Spring Retriever returns it unfailingly to tight closure. Neoprene seals at all edges keep wanted air IN — unwanted air OUT.

The SHOCK ABSORBER DOOR is built to withstand hundreds of thousands of openings with no costly "time outs" for repair. Needs virtually no maintenance. Surprisingly low in cost, the Door comes in a single easy-to-install unit. No extras to buy. See our insert in Sweet's Catalog or, better still, write us today for full information.

Makers of famous PREST-O-MATIC Industrial and Cold Storage Doors and Fire Door Operators.

CLARK DOOR COMPANY, INC. (since 1878)

**504 Hunterdon St.
Newark 8, N. J.**

See Us At Booth #1061, Plant Maintenance Show.

PRODUCTS EXHIBITED

Begins on page 136

PRODUCT	BOOTH
Southern Mfg. Co. Wood and neoprene floor mats*.	1024
Standard Industrial Products Co. Cigarette disposal units.	1014
Sugar Beet Products Co. Medicated skin cleansers, creams, and dispensing equipment.	809
Switzer Brothers, Inc. Fluorescent safety paint.	1012
Tool & Mfg. Co., Inc. Hand guards.	317
Wilbur & Williams Co., Inc. Floor safety coating.	321
Wooster Products Inc. Safety stair treads.	1029

HEATING, VENTILATING, AND AIR-CLEANING UNITS

American Air Filter Co., Inc. Dust, mist, and vapor collectors.	452
American Coolair Corp. Man-cooler and exhaust fans, power roof ventilators, wall shutters.	945
Bettcher Mfg. Corp., Panelbloc Div. Infra-red heating equipment.	1025
Clements Mfg. Co. Hot or cold air blowers.	556
Fuller Co. Backward inclined blade fan*.	114
Insto-Gas Corp. Salamanders; blower, infra-red heaters.	528
Johnson Corp. Steam, hot-water heaters.	931
Lunkenheimer Co. Boiler mountings.	830
National Heater Co., Inc. Space heaters, direct-fired unit*.	657
Radiant Lamp Corp. Infra-red lamps.	655
Rotherm Engineeering Co., Inc. Humidifiers*, air nozzles.	1035
Wheelabrator Corp. Dust and fume control equipment.	1016
Wiremold Co. Flexible air duct.	465

INSTRUMENTS FOR TEST, MEASUREMENT, AND DIAGNOSIS

Associated Research Inc. Megohmmeters; insulation, ground-resistance, high-voltage testers; cable fault locators; phase sequence indicators.	541
James G. Biddle Co. Electrical testing instruments, dielectric test and cable fault locators.	620
Com-Pak-Ett Mfg. Corp. Electric counters*.	460
Detroit Controls Div., American-Standard Pressure and temperature controls.	955
Excel Electric Service Co. Ground fault locating and indicating instruments.	547
Ideal Industries, Inc. Voltage testers.	511

* *Shown for the first time*

Turn the page

TILE-COTE

The Practical EPOXY!

TILE-COTE Activated Epoxy Coating provides an odorless, non-toxic protective film of extreme permanence and durability – possessing a hardness approaching that of glazed ceramic tile – in a practical MIM* finish which . . .

- **MIXES EASILY** – a simple blend of distinctly packaged components
- **KEEPS A WET EDGE** – for extreme ease of brushing (sprays beautifully, too!)
- **CONTAINS MORE EPOXY RESIN** – a full *consistent* measure in every color.

Amide-cured TILE-COTE – available in clear and 10 bright colors provides reliable *practical* protection against

Acids	Water (fresh or salt)	Steam
Alkalis	Petroleum (crude or refined)	Sewage

***MINIMUM-INTERRUPTION-MAINTENANCE** – the concept of specialized coatings which perform unusual services *quickly*, with minimum shut-down of plant operation.
Write for Bulletin P-57 with full data.

Creators of Advanced Coatings for Industry

THE WILBUR & WILLIAMS CO., INC.

Factory and General Offices, 651 Pleasant St., Norwood, Mass.
In Canada – 7920 16th Ave., Ville St. Michel, Montreal 38, P.Q.

See us at Booth 321, Plant Maintenance & Engineering Show, Chicago.

For more facts Circle 465 on Reader Service Card

Where Dirt Could Mean DANGER...

North American Aviation plant, Downey, Calif.

Vacuum cleaning during the final assembly provides all-important "last minute" protection.

You'll find SPENCER Vacuum Systems

Built-in vacuum systems by Spencer are being relied on increasingly by industry to protect product quality during inspection and assembly.

In this "white room" at the Autonetics plant of North American Aviation, for example, a Spencer system is utilized for:

1. Frequent floor cleaning to maintain critical standards of dust-free cleanliness.
2. Final cleaning of components—by use of bench inlets at the individual assembly stations.

Whatever **your** needs in a built-in system—or industrial portable vacuum cleaners—it will pay to check with SPENCER . . . world leader in industrial vacuum cleaning equipment.

Request Catalog #155B

SPENCER hartford

The SPENCER TURBINE COMPANY
HARTFORD 6, CONNECTICUT

PRODUCTS EXHIBITED

Begins on page 136

PRODUCT — **BOOTH**

International Research & Development Corp. 616
Vibration meter* and analyzers, portable balancing instruments.

Johnson Corp. 931
Liquid level and boiler water level controls.

Lincoln Engineering Co. 804
Liquid measuring equipment.

Martindale Electric Co. 526
Electrical testing equipment.

Western Industries, Inc. 431
Diesel nozzle testers.

LIGHTING EQUIPMENT

Appleton Electric Co. 525
Fixtures, reel lamps, and floodlights*.

Stewart R. Browne Mfg. Co. 437
Flashlights, portable explosion-proof and special inspection lights.

Com-Pak-Ett Mfg. Corp. 460
Photoelectric switches.

Holophane Co., Inc. 458
Industrial lighting units, office and outdoor lighting fixtures, crane light*.

Laduby Co., Inc. 605
Fluorescent lamp locks.

Marvel Lamp Co. 640
Incandescent, fluorescent, and slimline lamps.

McGill Mfg. Co., Inc. 606
Switches, lampguards, and lamp-changing equipment.

National Assn. of Lighting Maintenance Contractors 651
Cleaning, re-lamping, and repair of fluorescent and incandescent fixtures.

Radiant Lamp Corp. 655
Incandescent and mercury lamps.

Swivelier Co., Inc. 1010
Adjustable local lighting.

Westinghouse Electric Corp. 723
Lighting and lamps.

Wiremold Co. 465
Lighting equipment.

LUBRICANTS AND LUBRICATION EQUIPMENT

Alan Packing & Rubber Co. 1058
Packing lubricants.

Joseph Dixon Crucible Co. 1050
Dry film, maintenance and production lubricants.

Eagle Mfg. Co. 509
Hydraulic pump, push-bottom oilers.

Keystone Lubricating Co. 462
Special-purpose lubricants, greases, and fittings.

Lincoln Engineering Co. 804
Hand- and power-operated lubrication equipment, centralized equipment.

Lubriquipment Engineers, Inc. 206
Grease cups, centralized lubrication metering system*.

Lunkenheimer Co. 830
Lubricators.

* *Shown for the first time*

Turn the page

Allis-Chalmers lift trucks mechanical hands for your favorite brands

The F-40: first of a new series with POWER-CRATER engines that means more power with less fuel. Write now for free catalog.

Many of the most famous brand-name products of American industry are helped on their way to market on the forks, clamps, hooks and scoops of Allis-Chalmers multi-purpose lift trucks. They provide vital help in cutting critical handling costs . . . move material fast, lift it high, stack it carefully. And they're only part of the wide range of Allis-Chalmers material-handling equipment . . . including tractors, loaders, blowers and pumps. Allis-Chalmers, Milwaukee 1, Wisconsin.

POWER-CRATER is an Allis-Chalmers trademark.

ALLIS-CHALMERS

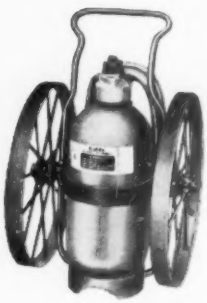
POWER FOR A GROWING WORLD

BH-152

NOW! GET FULL-POWER FIRE FIGHTING WITH KIDDE'S DRY CHEMICAL LINE!

2½ and 5 pound pressurized units! Granted top rating by U.L., these two units pack the extra punch needed to get the jump on fire. For example, the 2½ pound Kidde unit is as compact as a 1 quart carbon tet model, yet is eight times as powerful! Both the 2½ and 5 feature simple, two-step operation, easy-to-read dust-and-moisture-proof gauges. 10 pound dry chemical also available.

20 and 30 pound pressurized dry chemicals! Both these Kidde units have the same good features of the 2½ and 5, plus some "extras" all their own. Center balanced for fast action, rugged diffuser horn, speedy trigger operation, recessed pressure gauge and enclosed mechanism.



200 pound dry chemical wheeled unit! Kidde's 200 pounder discharges a 40-foot stream faster, has an *extra* 50 pounds of fire-smothering dry chemical to knock down fire quicker. Low center of gravity and wide wheels make it easy to maneuver. Easy-to-use discharge control makes operation simple.

400 pound stationary unit! Here's maximum protection in a minimum package! Like all Kidde units, this features sure, dependable performance and fast, easy operation. Either wall-mounted or free standing, leakproof and tamperproof, exclusive Bridgeman Seal, universal long-range nozzle, easy-to-read pressure gauge. 200 pound model also available.

Get the jump on oil, gas and electrical fires! Learn more about the complete line of dependable, efficient Kidde equipment—write today!

Kidde

Industrial and Marine Division
Walter Kidde & Company, Inc.
132 Main St., Belleville 9, N. J.
Walter Kidde & Company of Canada Ltd.
Montreal—Toronto—Vancouver

PRODUCTS EXHIBITED

Begins on page 136

PRODUCT	BOOTH
Metal Lubricants Co. High-temperature and special-purpose lubricants.	849
Mobil Oil Co. Cutting oils, hydraulic and circulating oils, greases.	741
Permatex Co., Inc. Rubber lubricant, transmission fluid.	424
Stewart-Warner Corp., Alemite Div. Centralized lubrication equipment.	902

MATERIALS AND SUPPLIES

Alan Packing & Rubber Co. Sheet and rod packings.	1058
American Sealants Co. Pressure and motion sealant.	477
Anchor Packing Co. Mechanical packings.	433
Armstrong Cork Co. Flexible and rigid* foamed plastic pipe insulation, lightweight insulation board.	956
Arro Expansion Bolt Co. Masonry drilling and fastening devices.	909
Associated Laboratories Treatment feeder for cooling towers, steam and condensate line treatment.	690
W. H. Brady Co. Markers for pipe, wire, and conduit; lubrication labels.	1046
Brooks Chemicals, Inc. Chemicals for water treatment.	953
A. M. Byers Co. Wrought-iron plate.	625
Diamond Expansion Bolt Co., Inc. Anchors, toggle bolts, drills, pipe straps, cable clamps.	308
Electric Materials Co. Non-ferrous castings and copper-brass forgings.	653
Eutectic Welding Alloys Corp. Low-temperature welding alloys, paste cleaner, fluxes.	875
Fibre Glass-Evercoat Co., Inc. Glass fibre cloth and mat, epoxy and polyester resins.	453
Gregory Industries, Inc. Drill anchors, fasteners.	847
Johnson Bronze Co. Bronze bars, powder metallurgy parts.	903
Lake Chemical Co. Pipe joint compounds, sealing cements, soldering fluxes.	674
La Salle Steel Co. Cold-finished steel bars.	208
Metal Lubricants Co. Hydraulic oils, metal cleaners and cutting fluids, synthetic coolants*, and drawing compounds.	849
Permacel Masking machines, tape and paper; duct-sealing tape; junction box mount and adhesive; thread sealant.	578
Permatex Co., Inc. Gaskets, glass sealer, and anti-seize compound.	424
Pittsburgh Corning Corp. High-temperature refractory, piping, and equipment insulation.	746

* *Shown for the first time*

Turn the page

WHEN THE PROBLEM CALLS FOR PAINT THE BEST ANSWER

IS INVARIABLY **Barreled Sunlight** ENGINEERED *Paints*

Washability is a major consideration in the selection of industrial paints — particularly where good housekeeping practices and high visibility standards demand frequent floor, wall and ceiling "scrubdowns".

The trick is to select paints which not only resist the abrasive action of water and cleaning compounds but which are *engineered* to provide maximum painting economy as well. And *this* is why the recommendations of Barreled Sunlight Engineered Paint representatives are acted upon so many times in so many plants. On job after job, the paints they recommend more than meet the toughest tests . . . *invariably* provide a better looking, longer lasting paint job at lower cost.

It will cost you less — now and in the long run — to talk over your plant paint requirements with a Barreled Sunlight representative. The coupon below is your invitation for a free consultation without obligation.

FREE! BARRELED SUNLIGHT PAINT "SLIDE GUIDE"

Contains complete information on Barreled Sunlight Exterior and Interior Finishes, Colors, Primers, and Thinners plus full application and special resistance data.

BARRELED SUNLIGHT PAINT COMPANY
124-A Georgia Avenue, Providence 5, Rhode Island

I want to learn more about Barreled Sunlight Engineered Paints and what they can do for us.

☐ Please have your representative call me to arrange an appointment without obligation.

☐ Please send me your new "Slide Guide" to Barreled Sunlight Paints.

Name.....

Title.....

Company.....

City.....*Zone*.....*State*.....

HAPPIER WORKERS

Less Effort, Greater Safety

HAPPIER BOSSES

Big Time and Cost Savings

Both Achieved by Use of

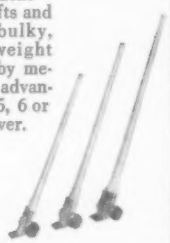
FAIRBANKS COST-CUTTER TRUCKS

Think of trucks as tools, and you recognize that the right truck makes lighter work of materials handling. With the right truck (the right tool) your men do more work with less effort, and with greater safety. Select your cost-cutter truck from Fairbanks' complete line of two-wheel hand and platform hand trucks. Available from leading distributors in all principal cities.

Barrel Stand Fig. No. 51 — for handling, storing and draining of steel drums. One man safely rocks full drum to drain position and wheels it.

All-Wood Dolly. Fig. T-1114 — Complete mobility for safer handling of unwieldy, bulky objects. Oak frame on four LOCKWELD double ballrace swivel casters.

Lever Trucks— Safely lifts and moves bulky, heavy weight objects by mechanical advantage of 5, 6 or 7 foot lever.



Barrel Truck. Fig. No. 9090— Without ever being touched, barrels, drums, and kegs of any height are safely loaded and unloaded.

General Purpose Truck. Fig. 9215-S— Comfortable "feel" and general usefulness promotes use of truck, and safer movement of objects of every description.

"Stairmaster" Appliance Truck Fig. No. A-1 — Protects and provides safer movement over curbs and steps. Load securely strapped to rubber-sheathed, lightweight, all-steel frame. Patented.

Buy Through Distributors. Fairbanks products are stocked, sold and recommended by leading distributors in all the principal cities across the nation.

THE **Fairbanks** COMPANY

Executive Office: 393 Lafayette Street, New York 3, New York

Valves • Dart Unions • Casters • Trucks • Wheels

520 Atlantic Ave. Boston 10, Mass. | 2600 S. Throop St. Chicago 8, Ill. | 393 Lafayette St. New York 3, N. Y. | 15 Stanwix St. Pittsburgh 22, Pa. | 202 Division St. Rome, Ga.

Factories — Binghamton, N. Y. and Rome, Ga.

PRODUCTS EXHIBITED

Begins on page 136

PRODUCT	BOOTH
Rawlplug Co., Inc.	924
Masonry anchoring devices and drills.	
Rohm & Haas Co.	645
Plastic shop equipment.	
Swift & Co.	1008
Adhesives.	

MATERIAL-HANDLING EQUIPMENT AND PARTS

Acme-Hamilton Mfg. Corp.	757
Belting for handling abrasive, oily and hot materials.	
Albion Industries, Inc.	874
Industrial casters and wheels.	
Allis-Chalmers Mfg. Co.	225
Lift trucks.	
American Chain & Cable Co., Inc.	820
Hoists, wire rope slings, sling chains.	
Automatic Transportation Co.	125
Gasoline and electric fork-lift truck equipment.	
Bassick Co.	961
Casters, locks, clamps, and fasteners.	
Chisholm-Moore Hoist Div., Columbus McKinnon Chain Corp.	546
Electric and manually operated hoists, I-beam monorail trolleys.	
Columbus McKinnon Corp., Chain Div.	548
Sling chains, coupling links.	
Cushman Motors	630
Gasoline and electric trucks.	
Delaware Barrel & Drum Co., Inc.	677
Molded polyethylene tanks and shipping containers, polyethylene fittings.	
Dexion, Inc.	568
Casters and conveyors.	
Duff-Norton Co.	762
Hand-chain, electric-air and ratchet-lever hoists; hydraulic and screw jacks; hydraulic rams and pumps.	
Economy Engineering Co.	557
Elevating platforms and trucks, lifting and transporting devices.	
Fairbanks Co.	476
Casters, wheels, two-wheel and platform hand trucks.	
Faultless Caster Corp.	1042
Casters and wheels; also sealed-bearing casters*.	
Hollywood Plastics, Inc.	432
Boxes, carts, racks, and dollies; instrument cases.	
Jones & Laughlin Steel Corp.	862
Wire ropes and slings, belt slings*, ropes*, splices, hand and power hoists*.	
G. B. Lewis Co.	766
Woven containers, nesting tote pans, covers, dollies, four-wheel truck, unitized containers, and mounting accessories*.	
Maco Industries, Inc.	656
Industrial truck wheels*.	
Martin Engineering Co.	1009
Vibration inducers, auxiliary equipment.	
Metal-Cladding, Inc.	591
Glass-reinforced polyester tank.	
National Vulcanized Fibre Co.	832
Boxes, trucks, cans, trays.	

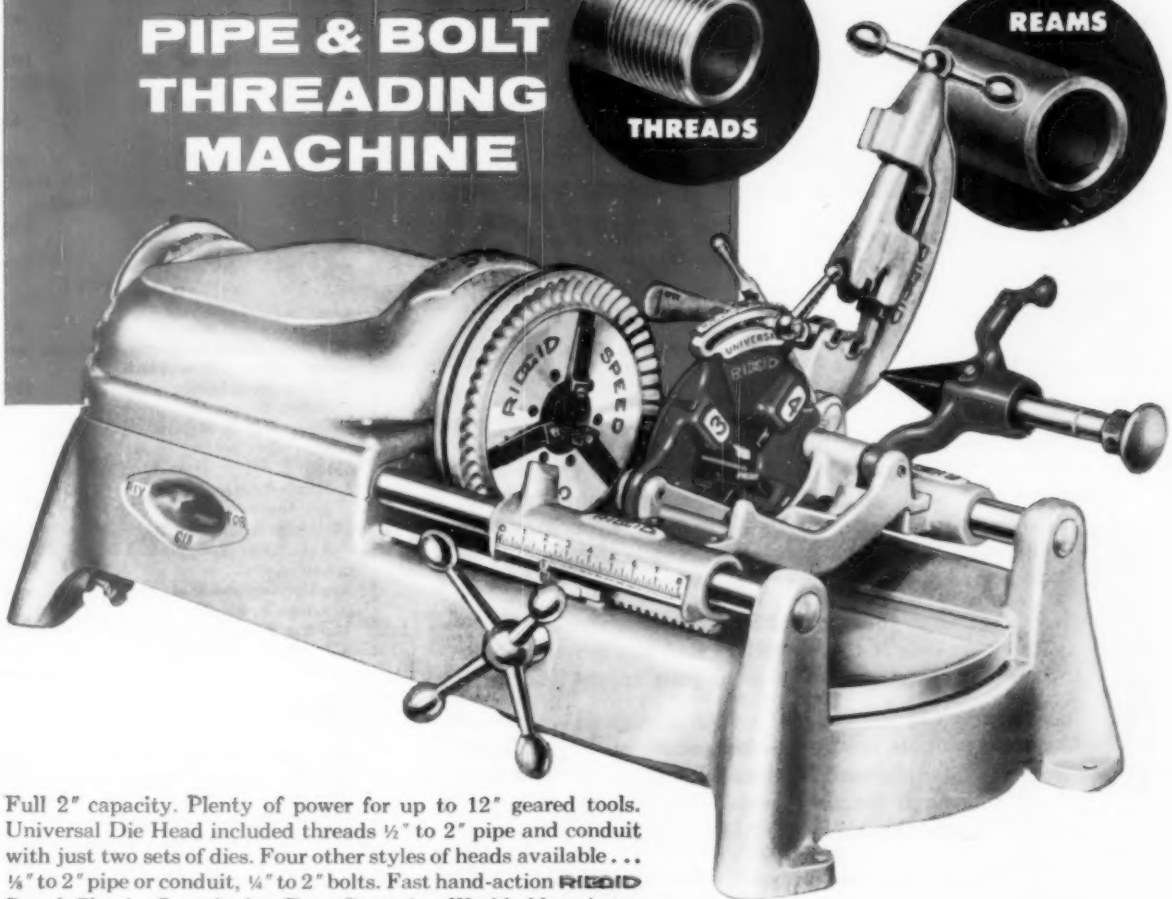
* *Shown for the first time*

Turn the page

Pays for itself fast . . . in labor savings alone!

RIDGID 535 PIPE & BOLT THREADING MACHINE

A Complete Pipe and Conduit Workshop At Your Finger Tips . . . For High-Speed Threading, Cutting, Reaming



Full 2" capacity. Plenty of power for up to 12" geared tools. Universal Die Head included threads ½" to 2" pipe and conduit with just two sets of dies. Four other styles of heads available . . . ⅛" to 2" pipe or conduit, ¼" to 2" bolts. Fast hand-action RIDGID Speed Chuck. Cam-Action Rear-Centering Workholder. Automatic re-circulating oil system. Easy-to-Read Length Gauge.

See and Try This Time and Cost-Saving RIDGID 535 at Your Supply House Today

RIDGID®

THE RIDGE TOOL COMPANY, ELYRIA, OHIO, U. S. A.

Canadian company saves 2,300 dollars a year on their plant security program

BCDT provides us with maximum security against losses from fire, burglary and other hazards. We have a modern plant with modern protection, and moreover, we are saving money!

John L. Walter

Director of Manufacturing

Nowadays, automatic plant security is an international reality. The discovery that *the best security is the most economical*, as noted in the above excerpt from Mr. John Walter's letter, is not unique. It is being experienced by businessmen, from coast to coast in Canada and the United States, with savings in many cases reaching five figures.

No matter what your type of business, or where it may be located, you owe it to yourself to find out how complete automatic protection can step up your security and cut down your budget.

The same reliable round-the-clock alarm and supervisory services that safeguard billions of dollars of American property through the nationwide ADT System, are available in Canada through three ADT-Associated companies.

Alberta Alarm Company in Edmonton and Calgary

British Columbia District Telegraph Co. Ltd. in Vancouver

Dominion Electric Protection Company
in Montreal, Ottawa, Toronto and Winnipeg.

SEE US IN BOOTH 1062

AMERICAN DISTRICT TELEGRAPH COMPANY

Executive Office: 155 Sixth Avenue, New York 13, N. Y.

A NATIONWIDE ORGANIZATION

ADT

PRODUCTS EXHIBITED

Begins on page 136

PRODUCT	BOOTH
Parker Sweeper Co. Utility carts.	529
Rapids-Standard Co., Inc. Hand trucks, wheels, casters.	904
Spencer Turbine Co. Pneumatic conveying systems.	1006
Sterling Fleischman Co. Drum lifts, overhead hoisting yoke.	1017
Stokvis Multiton Corp. Dollies, pallet, and skid trucks; crate movers.	926
S. G. Taylor Chain Co., Inc. Alloy steel hooks and sling chains.	672
Union Wire Rope Corp. Braided slings.	416
Vac-U-Max Pneumatic conveyor equipment.	101
Vanguard Mfg. Co. Mobile floor cranes, electric tractors, power drive for hand-propelled units.	732
Vibro Plus Products, Inc. Bin vibrators.	977
B. E. Wallace Products Corp. Universal gantries, tripods, trolleys, jacks, A-frames*, and accessories.	1066
Western Industries, Inc. Lifting jacks.	431
Yale & Towne Mfg. Co. Gas- and electric-powered lift trucks; hand, air, electric hoist equipment.	850

MECHANICAL POWER TRANSMISSION EQUIPMENT

Boston Gear Works Gears, speed reducers, bearings, universal joints, pillow blocks.	811
Flexible Steel Lacing Co. V-belt fasteners.	1052
Hoover Ball & Bearing Co. Bearings: roller, radial ball, pillow block, flange and machine unit.	827
Johnson Bronze Co. Bearings.	903
Manheim Mfg. & Belting Co. Adjustable V-belts and variable-speed belts.	438
Rapids-Standard Co., Inc. Roller bearings.	904
Thomas Flexible Coupling Co. Flexible couplings.	920

MISCELLANEOUS

Best Universal Lock Co., Inc. Locks, padlocks, master key systems.	451
Clements Mfg. Co. Furnace-boosting blowers.	556
Electro Rust-Proofing Corp. Protection systems for automatically maintaining correct cathodic currents*.	531
Gravely Tractors Tractors and attachments, lawnmowers.	513
Lincoln Engineering Co. Adhesive, sealing compound dispensers.	804
Manpower, Inc. Labor services for car unloading, warehousing, material handling.	765

* *Shown for the first time*

Turn the page

split-second radio contact cuts high-speed production losses

1 Quality control inspector, who has located a problem, dials the Radio Pager of a foreman . . . by using one of the FM transmitter phones located at strategic points throughout the plant.

2 When the foreman hears a tone sound from the Radio Pager clipped to his belt, he presses a button and hears the verbal instructions thru the plug-type ear receiver used for clear reception in all areas.

3 Continental Can plant manager, W. K. Brown, hears all messages over his monitor unit. By constantly being informed of plant problems, he can step in personally when the situation warrants.

AT THE SAN JOSE PLANT OF CONTINENTAL CAN COMPANY

...a new quality control technique with

MOTOROLA Radio Pager

When Continental's inspectors detect potential flaws, adjustment instructions are immediately forwarded over the Motorola Radio Paging System to the personnel at the site of the problem. Instant corrective measures are then taken *BEFORE* a sudden flow of substandard cans would necessitate costly stoppage of the line. It's understandable why Motorola's Radio Pager has had a direct effect on reducing reject scrap and in cutting production downtime at this Continental Can Co. Plant.

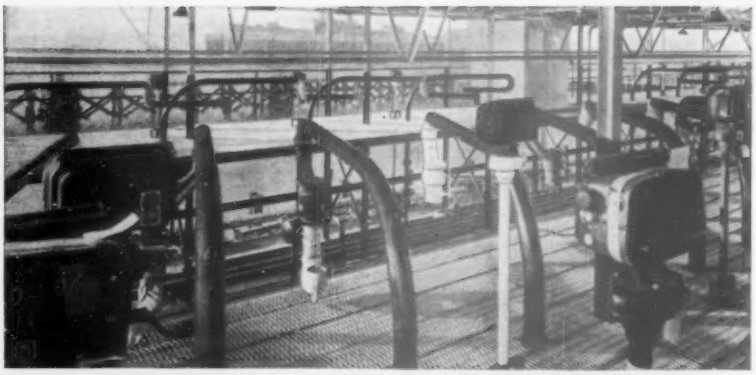
The Motorola Radio Pager allows your firm to increase efficiency, save manhours and meet emergencies faster. Gone is the time wasted in chasing and tracing a certain man who is urgently needed . . . gone is the confusion of bells or public address calls. The Motorola Radio Pager slips in the pocket or clips to the belt . . . instantly, privately pages the wearer and quietly relays the message directed only to him. WRITE MOTOROLA TODAY FOR MORE INFORMATION.

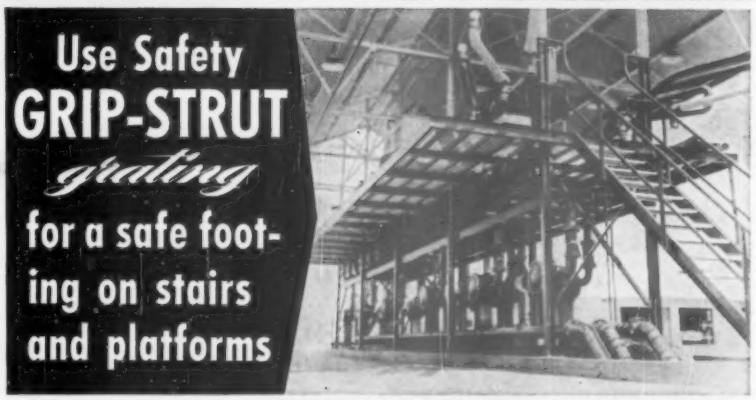
"Handie-Talkie" is a trademark of Motorola Inc.

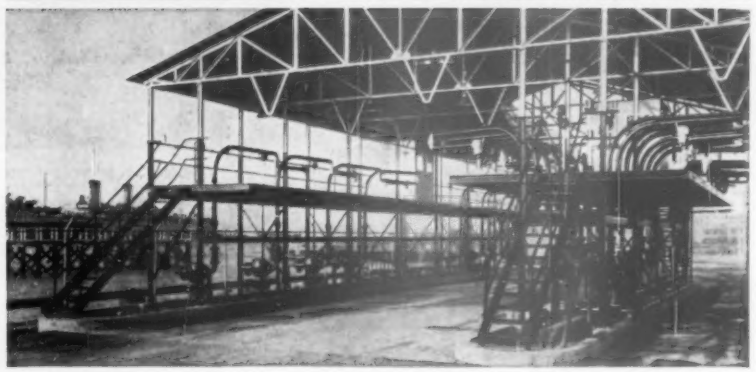
HANDIE-TALKIE®

MOTOROLA Radio Pager

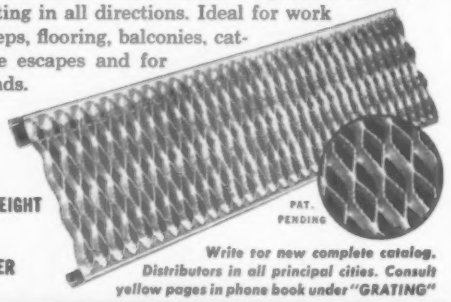
Motorola Communications & Electronics, Inc., 4501 Augusta Blvd., Chicago 51, Ill. A Subsidiary of Motorola Inc.







SAFETY GRIP-STRUT is the new basic material, all in one piece (including channels), not welded, riveted or expanded in steel or aluminum, in standard sizes and gauges. Safety GRIP-STRUT presents an open space, in a diamond pattern, in excess of 55% of the area for ready access of light and air and gives a positive NON-SKID footing in all directions. Ideal for work platforms, stair and ladder steps, flooring, balconies, catwalks, machinery guards, fire escapes and for original equipment safety treads.



Important Safety Features

- FIRE PROOF
- SLIP PROOF
- MAXIMUM STRENGTH
- MINIMUM WEIGHT
- EASY TO STAND ON
- COOL IN SUMMER — WARM IN WINTER

107

Write for new complete catalog. Distributors in all principal cities. Consult yellow pages in phone book under "GRATING"

GRIP-STRUT

PRODUCTS DIVISION
The **GLOBE** *Company*
4014 S. PRINCETON AVE., CHICAGO 9, ILL.

PRODUCTS EXHIBITED

Begins on page 136

PRODUCT	BOOTH
Markal Co. Marking sticks, temperature indicators.	674
National Electrical Contractors Assn. Electrical installation services.	464
New Hermes Engraving Machine Corp. Machine for nameplates, signs, etc.	1041
Philco Corp. Electronic technician training materials, closed circuit television.	1030
Protectoseal Co. Drum transfer pumps.	911
Shell Oil Co. Hydraulic fluid, petroleum.	922
Steel Sash Service, Inc. Steel sash repair.	932
Weber Marking Systems, Inc. Label and tag imprinting machine, label printing machines, and electric stencil dispenser*.	1026

PROTECTIVE COATINGS, PAINTING EQUIPMENT

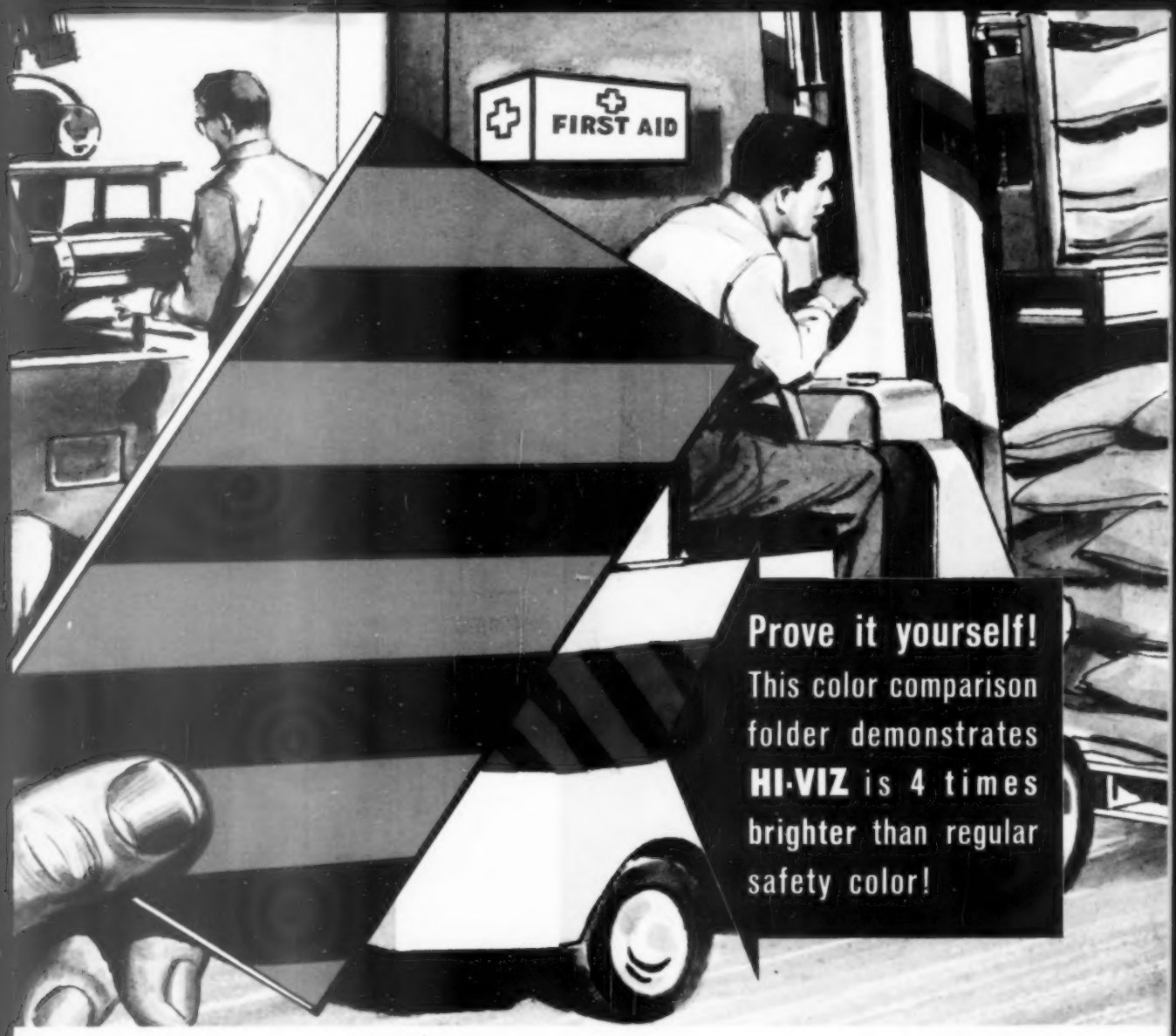
Arco Co., Div. of American-Marietta Co. Paints and protective coatings.	910
Barreled Sunlight Paint Co. Heavy-duty finishes.	1349
Philip Carey Mfg. Co. Paints and coatings.	702
Consolidated Chemical & Paint Mfg. Co. Multi-surface finishes, enamel, rust inhibitive primer, floor finishes.	1015
Desco International Assn. Wall and floor coatings.	577
Dispo Spray Booths by Sheila Spray booths, automatic dry booth.	1077
Joseph Dixon Crucible Co. Paints and enamels.	1050
Fence Painter Corp. Paints, paint rollers, striping machines, hydraulic sprayer.	519
Fibre Glass-Evercoat Co., Inc. Epoxy paint.	453
Gates Engineering Co. Corrosion protective coatings, linings.	510
Glidden Co. Coating for machinery equipment and floors; tank and structural coating; polyester wall coating; interior and exterior metal finish.	706
Gray Co., Inc. Spray apparatus, pumps, calking units.	935
A. C. Horn Co. Corrosion-resistant coatings.	647
S. C. Johnson & Son, Inc. Polymer floor finish*.	619
Lawter Chemicals, Inc. Fluorescent safety paint.	1067
Lincoln Engineering Co. Hydraulic paint spray equipment.	804
Maintenance Products, Inc. Metal protection emulsion.	1011
Markal Co. Heat-proof coatings.	674
Metal Lubricants Co. Rust preventives.	849

* *Shown for the first time*

Turn to page 161

For more facts Circle 474 on Reader Service Card

For more facts Circle 475 on Reader Service Card ➤


FIRST AID
Prove it yourself!
This color comparison folder demonstrates HI-VIZ is 4 times brighter than regular safety color!

Test HI-VIZ® *fluorescent safety* COLOR *in your plant* FREE!

Write today for your free HI-VIZ Color Comparison folder. See how HI-VIZ Fluorescent Safety Paint can work for you in and around your plant. Detach the special HI-VIZ Safety Color comparison panel and adhere it to any area or equipment now painted with "regular" safety color. From any distance, HI-VIZ will prove its superior safety value . . . its unduplicated ability to attract immediate attention! Once you've made the HI-VIZ test, you'll want to safety-mark your entire operation with HI-VIZ Fluorescent Safety Paint. Write today for your Free HI-VIZ Color Comparison folder and complete literature pack: color swatches, "101" Uses leaflet, HI-VIZ Color Code charts, technical bulletin and industrial price list.

For Full Scale HI-VIZ Paint Test

Order HI-VIZ Safety Kit S-20: Contains one 16 oz. aerosol spray-can each of 506® White Primer, HI-VIZ Color and UVITRON® Protective Sealer plus qtr. pt. each of 8 HI-VIZ Colors in alkyd enamel, with 2 qtr. pts. each of 506 White Primer and UVITRON Protective Sealer. **$20.00 each plus postage—shipping weight 10 lbs.** Order through your distributor or write Lawter today. Money-back guarantee if HI-VIZ does not perform as specified.

LAWTER CHEMICALS, INC.

Dept. F, 3550 Touhy Avenue, Chicago 45, Illinois, AMbassador 2-8400

San Leandro, California • CHICAGO • South Kearny, New Jersey

U. S. AND FOREIGN (except Canada): E. D. Bullard Company Distributors.

IN CANADA: Safety Supply Company, Toronto, Ontario.

EAGLE
OILERS and CANS

THE COMPLETE LINE

Eagle high-quality oilers and cans are made in all styles and sizes, for every purpose. Efficient design and sturdy construction assure economical, lasting, dependable service.

Copperite

STEEL BENCH OILERS

for the mechanic, engineer, plumber, machinist, car owner . . . rigid-vertical or flexible spout . . . ⅓, ½, 1 pt. capacity.

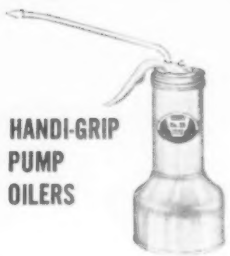
#66 ALL-PURPOSE PISTOL GRIP OILERS

modern-design oilers of many uses . . . one drop or a full stream of oil . . . rigid-angle or flexible spout . . . 6 oz. capacity.

HYDRAULIC PUMP OILERS

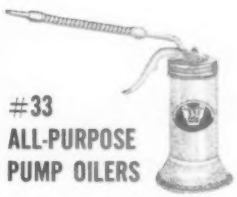
keep moving parts of mobile equipment and machinery running smoothly . . . flexible, straight or angle spouts . . . ¾, 1, 2, 4 pt.

HANDI-GRIP PUMP OILERS



general-purpose oilers with positive-acting pump . . . leak-proof bodies, steady stance, won't tip over . . . rigid-angle or flexible spout . . . ¾, 1, 1½, 2 pt.

#33 ALL-PURPOSE PUMP OILERS



for home workshops, farms, service stations, factories, hobbyists . . . dependable, reasonably-priced . . . rigid-angle or flexible spout .6 oz.

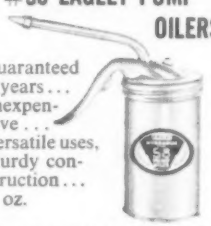
WELDED STEEL BENCH OILERS

for heavy factory use . . . flexible, rigid-vertical spouts . . . optional seal tip prevents leaking . . . ½, ¾, 1 pt.

SAFETY PLUNGER CANS

safe cleaning with flammable liquids . . . strong, durable, reliable . . . Factory Mutual approved . . . 1, 2 qt., 1 gal.

#58 EAGLET PUMP OILERS



guaranteed 5 years . . . inexpensive . . . versatile uses, sturdy construction . . . 4 oz.

SAFETY BENCH CANS

for cleaning small parts safely, quickly . . . approved by Factory Mutual . . . seamless body . . . 1, 2 qt., 2 gal.

MIDGET HOUSEHOLD OILERS

for office or home, oiling fans, hinges, typewriters, sewing machines, washing machines . . . ½, 1 oz.

WELDED STEEL SUPPLY CANS

storage and filling cans for mills, factories, railroads, mines, foundries . . . ½, 1, 2, 2½, 5 gal.

SAFETY CANS

approved by Underwriters Laboratories and Factory Mutual . . . safe for handling all flammable liquids . . . 1, 2 qt., 1 gal. with trigger handle; 2½, 5 gal. with free-swing handle.

GALVANIZED GASOLINE & OIL CANS

one-piece seamless dome shape . . . no top seam, no side seam . . . made from high-grade 26-gauge galvanized steel for hard use . . . 1, 2, 2½, 5 gal.

EAGLE MANUFACTURING CO.

Wellsburg, W. Va.

Serving the Trade Since 1894

ORDER FROM YOUR SUPPLIER

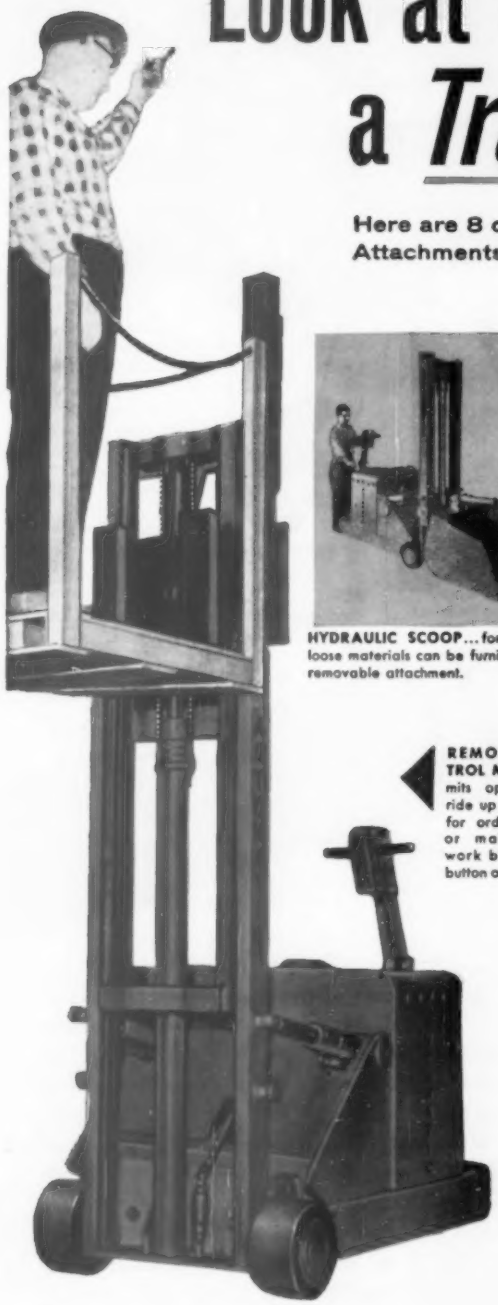
Write for free catalog showing the Complete Eagle Line • Eagle products are also available in Canada.

ALL EAGLE PUMP OILERS GUARANTEED 5 YEARS!

For more facts circle 476 on Reader Service Card

Look at all-these things a *Transporter* can do!

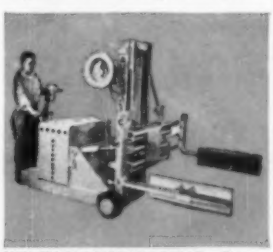
Here are 8 cost-cutting ways Automatic's Standard Attachments can turn Transporters into Specialists



These specially designed standard attachments can add job flexibility to your Transporter Stacker. Now, a variety of jobs can be performed at considerable cost savings.

HYDRAULIC SCOOP... for handling loose materials can be furnished as a removable attachment.

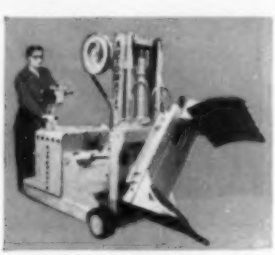
REMOTE CONTROL MAST permits operator to ride up and down for order picking or maintenance work by pushing button on carriage.



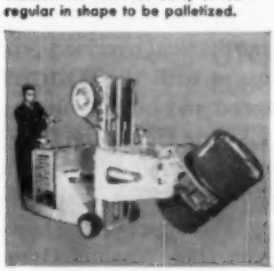
UTILITY CLAMPING DEVICE... Clamp arms can be attached to forks for handling cartons, etc. Clamp arms can be removed to handle pallets.

MECHANICAL GRAVITY DRUM DUMPER... Removable attachment to fit on forks.

GOOSENECK CRANE ATTACHMENT... for items too bulky or too irregular in shape to be palletized.



REVOLVING PAPER ROLL CLAMP ...handles rolls vertically or horizontally... revolves 360° right or left.



HYDRAULIC DRUM HANDLER... picks up and carries any standard drum ...180° controlled forward dumping.

CABLE REEL HANDLER... lifts and transports wire and cable reels.

First in Imagination...

First with Reality

AUTOMATIC®

AUTOMATIC TRANSPORTATION COMPANY
Division of the Yale & Towne Manufacturing Company
39 West 87th Street, Dept. AO, Chicago 20, Illinois

MAIL COUPON TODAY

Please mail me the data indicated below

- ☐ "Transporter Facts and Factors"
- ☐ Descriptive literature on special attachment for the following type of work.....

NAME_____ TITLE_____

FIRM_____

ADDRESS_____

CITY & ZONE_____ STATE_____

New from Wright!

Built-In Overload Protection for Operator, Load and Hoist with the New Wright Overload Cutoff*!

• Now, for the first time on any electric hoist, you can have safe, sure, mechanical overload protection as a built-in feature with the WRIGHT **Overload Cutoff.** Designed and built to fit any new WRIGHT *Speedway* Electric Hoist, the Overload Cutoff unit you see pictured above is a compact, integral part of the hoist frame itself. As a result, it becomes a functional part of the hoist *at no sacrifice in headroom*. The WRIGHT Overload Cutoff is simple in design and should give dependable, trouble-free operation during the entire life of the hoist under normal operating conditions. Calibrated and sealed at the factory for the user's protection, the unit takes rugged abuse up to the critical point of overload—then instantaneously "breaks" the raising circuit of the hoist. This allows the load to be safely lowered to the floor and unhooked. Once this is done, the raising circuit of the hoist is again automatically restored.

The WRIGHT Overload Cutoff is available now as standard equipment on all new WRIGHT Frame 2 & 3 *Speedway* Electric Hoists, and as optional equipment on new Frame 1 & 1½ models.

Find out how WRIGHT *Speedway* Hoists equipped with Overload Cutoff can bring practical, fast-acting overload protection to your material handling operations. For complete information, write our York, Pa., office.

*Patent applied for

***See your WRIGHT Distributor** about the Speedway Electric Hoist line or write us for Catalog E-58*

In Canada: UPTON, BRADEEN & JAMES LTD., Montreal, Ottawa, Toronto, Hamilton, Windsor, Winnipeg, Vancouver

WRIGHT HOISTS

ACCO

Wright Hoist Division • American Chain & Cable Company, Inc.

York, Pa., Atlanta, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

For more facts Circle 478 on Reader Service Card

PRODUCTS EXHIBITED

Begins on page 136

PRODUCT	BOOTH
Multi-Clean Products, Inc. Concrete seals in colors.	604
Permacel Epoxy protective coating.	578
Rust-Oleum Corp. Rust- and chemical-resistant coatings.	742
Sundure Paint Corp. Cement and epoxy coatings*.	107
Swift & Co. Finish for masonry surfaces.	1008
Tropical Paint Co. Spray enamels, paints.	535
Truscon Laboratories Anti-corrosion coatings, machinery and equipment coatings, masonry protective coatings, floor treatments.	565
Turco Products, Inc. Deflocculators, booth coatings.	623
Wilbur & Williams Co., Inc. Epoxy, damp surface, rust preventive, and liquid galvanizing coatings.	321

RECORD AND TIMING SYSTEMS

Acme Visible Records, Inc. Card systems for stock control, scheduling, preventive maintenance, etc.; visual control panels; rotary files.	716
Addressograph-Multigraph Corp. Automatic scheduling and reporting systems.	978
Remington Rand Systems Visible record cabinets; control systems for preventive maintenance, inventory, etc.; visible chart board for scheduling; visible reference equipment for bin locator and other cross-reference records.	815
VisiRecord, Inc. Record-keeping systems for preventive maintenance and inventory controls.	692

SCAFFOLDS, LADDERS, AND PLATFORMS

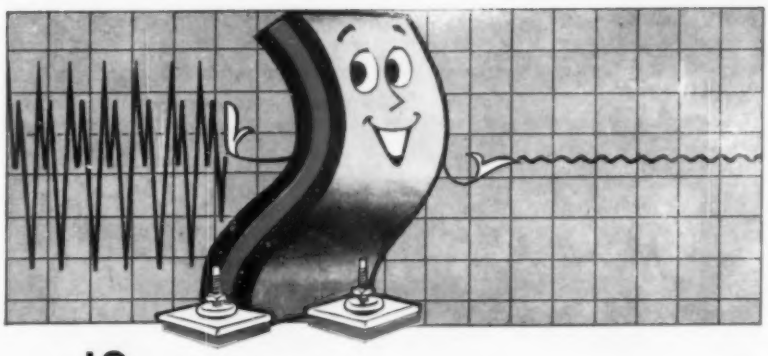
Ballymore Co. Mobile work platforms, mobile aluminum extension ladders, step ladders, hydraulic access lift.	731
Economy Engineering Co. Telescopic lifter, powered mobile lift*.	557
Patent Scaffolding Co., Inc. Scaffolds and ladders.	901
Putnam Rolling Ladder Co., Inc. Ladders.	1013
Reynolds Televator Corp. Electrically operated telescoping aluminum work platforms.	668
Safway Steel Products, Inc. Rolling scaffold tower, hydraulic lift maintenance tower.	923

SHOP EQUIPMENT

Aeroquip Corp. Hose assembly machines and tools.	700
American Pullmax Co., Inc. Shearing, forming machines; beveler*.	642

* *Shown for the first time*

Turn the page



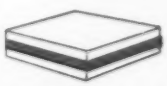
IS

VIBRATION

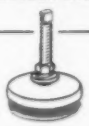
ROBBING YOU BLIND?

Transmitted vibration in your plant or office is a universal culprit that keeps attacking your costs and operating efficiency in a hundred ways . . . unless checked at its source.

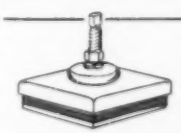
Unisorb machine mounts — either pads or Level-Rite devices — reduce up to 85% of this transmitted vibration and provide a practical, low-cost solution to almost all vibration problems. Unisorb Vibration Control reduces noise, worker fatigue and human inefficiency. Unisorb will reduce maintenance of buildings and machines, cut down-time and simplify machine installation. In addition, tests show that Unisorb permits running machines at higher speeds and closer tolerances for increased production and improved quality.



Unisorb Mounting Pads
Unisorb pads are the basic vibration control unit, identified by the red centers and brand mark. Available in a wide range of densities and thicknesses for proper application. Saves up to 80% in installation time and costs.



Unisorb Level-Rite 200
Unisorb Level-Rite "Junior" has been especially designed for light machines, air conditioners, business machines and similar equipment. A low cost, precision leveling device and vibration control unit, with loading limit of 200 lbs. per unit. Ideal for original equipment.



Unisorb Level-Rite Mount
Unisorb Level-Rite is a universal, self-contained leveling device for all types of machines. Fast, simplified way to achieve and hold precise level. Available with exclusive screw-post design or as a basic mounting plate for use with built-in leveling devices.

Remember — to simplify installation, improve performance and control vibration . . .

UNISORB MOUNTS MAKE THE DIFFERENCE

. . . for all types of machines from laboratory equipment to giant presses.
Ask for a Money-Back Trial . . . Now!

UNISORB

UNISORB 206 SOUTH STREET, BOSTON 11, MASSACHUSETTS

Division of The FELTERS Company New York, N. Y. • Chicago, Ill. • Detroit, Mich. • Upper Darby, Penna. • St. Louis, Mo. • Taylor Felt & Supply Co., San Francisco, Calif. • Acorn Mfg. Co., Los Angeles, Calif.

Please send me a Unisorb Sample and Free Book.

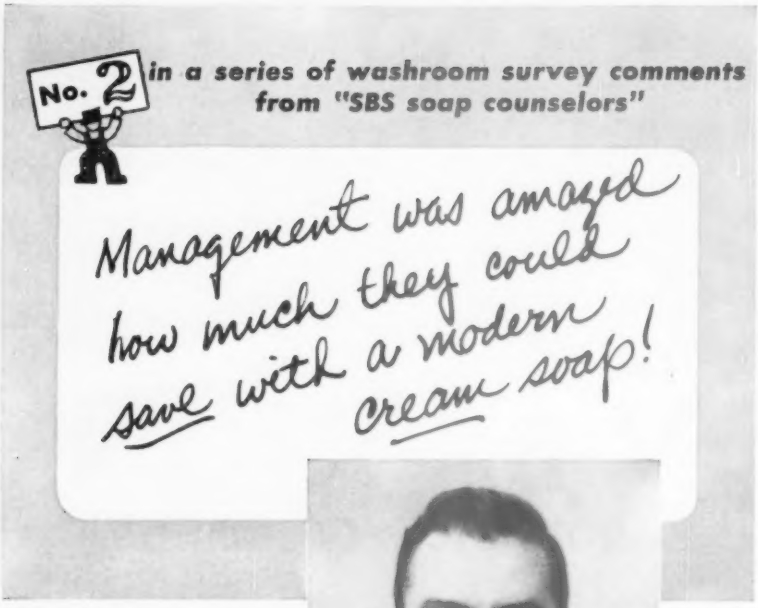
Name.....

Company.....

Address.....

City.....Zone....State.....

FEB-61


No. 2
in a series of washroom survey comments from "SBS soap counselors"
Management was amazed how much they could save with a modern cream soap!

John F. Murphy

is a veteran SBS soap counselor in a major industrial market, has helped many managements pinpoint the most economical solution to skin cleansing problems. This is a typical example.

"Our washroom surveys found maintenance dollars (and employee morale) literally disappearing down the drains at a midwest stamping plant employing 2300 workers. Many employees complained that the powdered soap in general use irritated their skin. Few dispensers were operating efficiently. The result was a lavish waste of soap, slippery floors, unsightly washrooms . . . maintenance couldn't keep up! OPERATION PINPOINT demonstrated not only how this plant could cut its soap costs but how it could drastically reduce maintenance costs by using SBS-60, a *cream* deodorant soap specially formulated for industrial use. This modern cleansing agent removes *all* the general soils in the stamping plant . . . is equally safe on hands, face or body . . . and virtually eliminates soap waste!"

Money-saving suggestions like this *begin* with OPERATION PINPOINT — a thought-provoking presentation filled with facts about skin hygiene and washroom maintenance. The SBS soap counselor serving your area can pinpoint the right soap to do every skin cleansing job best and at lowest cost in your plant. Let him show you OPERATION PINPOINT . . . just call your nearest SBS office, collect.

the washword of industry

sugar beet products co.

SAGINAW, MICH. • Los Angeles, Calif. • Newark, N.J.
CANADA: Chemical By-Products, Ltd., Toronto, Ontario

PRODUCTS EXHIBITED

Begins on page 136

PRODUCT	BOOTH
Associated American Winding Machinery, Inc.	**853**
Coil-winding machinery*, wire-spooling machinery, twist drill grinders*.	
Clipper Mfg. Co.	**507**
Gasoline*, air*, and electric masonry saws; concrete saws; blades; core bits.	
Collins Machinery Corp.	**708**
Pipe and bolt threading machines, abrasive cut-off machine, roller pipe and tube cut-off machine.	
Clifford B. Hannay & Son, Inc.	**205**
Hose and cable reels.	
Insto-Gas Corp.	**528**
Metal melting furnaces.	
Oster Mfg. Co.	**705**
Pipe and bolt threading machines, cutting-off machine*.	
Punch-Lok Co.	**626**
Hose clamping machines.	
J. A. Richards Co.	**448**
Bending equipment, die making equipment and supplies.	
Stewart-Warner Corp., Industrial Electronic Balancer Dept.	**560**
Balancers, vibration monitors.	
Templeton, Kenly & Co.	**201**
Mechanical and hydraulic jacks and pullers; hydraulic grip and push-pullers.	
Toledo Pipe Threading Machine Co.	**523**
Pipe thread cutters and reamers, copper tubing tools, vises.	
Weatherhead Co., Ft. Wayne Div.	**1004**
Hose cutting and skiving machine*, reusable hose assembly machine*, 45-deg. hose swaging machine, tube tools.	
Wells Mfg. Corp.	**615**
Band saws.	
Wheelabrator Corp.	**1016**
Airless, wet-blast cleaning equipment.	
Wheel Trueing Tool Co.	**866**
Diamond drills, blades, and accessories; masonry saws.	

TOOLS—HAND

Cincinnati Tool Co.	**949**
Clamps, chisels, punches, and drills.	
Clements Mfg. Co.	**556**
Blow torches.	
Electric Materials Co.	**653**
Copper hammers, soldering tools.	
Erie Tool Works	**552**
Pipe wrenches and cutters, threaders, vises, tubing tools, tee former*.	
Gregory Industries, Inc.	**847**
Stud drivers*.	
Ideal Industries, Inc.	**511**
Electricians' pliers, fish tapes.	
Insto-Gas Corp.	**528**
Soldering torches.	
Millers Falls Co.	**868**
Hand tools, hack-saw blades.	
Nye Tool Co.	**1045**
Pipe wrenches and cutters, die heads*, die stocks, knockout punches.	
Proto Tool Co.	**749**
Hand tools, adjustable wrenches, retaining ring pliers.	

** Shown for the first time*

Turn to page 166

LABOR COST CUT 25% ON OVERHEAD CONDUIT AND FIXTURE WORK

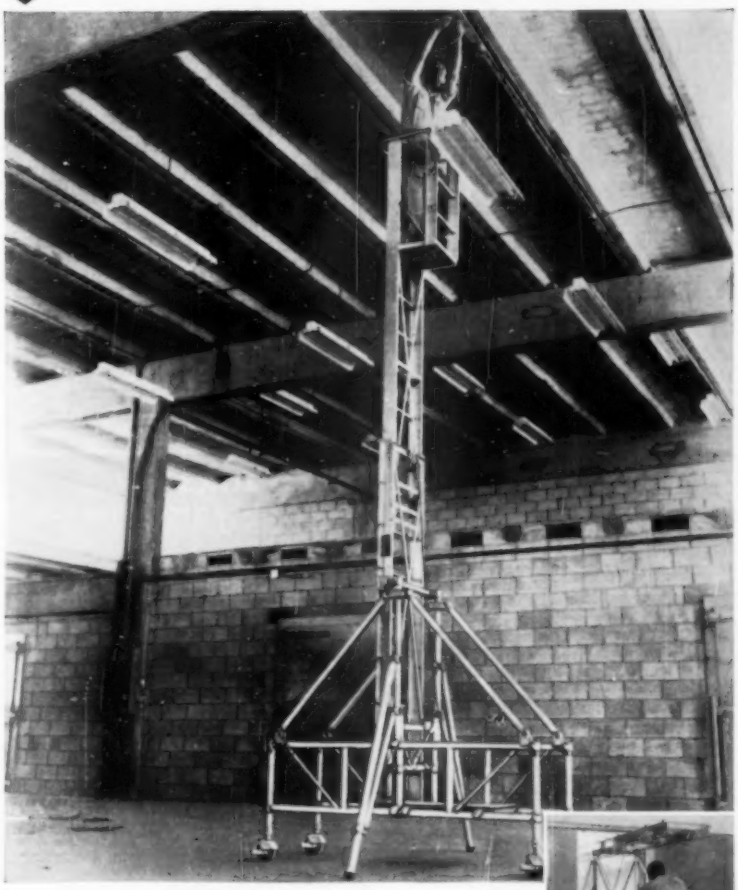
Up-Right aluminum scaffold-on-wheels gets men up in the air fast...lets them finish the job fast! Lightweight and quickly assembled without tools or loose parts, Up-Right scaffolds are adjustable to provide a safe, convenient working platform at any desired height. In 3 basic types for overhead installation and maintenance.

STAIRWAY TYPE

SPAN TYPE

TALLESCOPE

HERE'S HOW INDUSTRY SAVES ON OVERHEAD MAINTENANCE WITH NEW ALUMINUM SCAFFOLD



3,600 fluorescent fixtures in 78 separate bays of Atlanta, Georgia, plant required lamping. Passage from bay to bay was through standard height doorways. Conventional fixed scaffolding requiring dismantling on each move was impractical. Tallescope, the telescoping work platform, was used because it saved 25% of combined set-up and installation time compared with extension ladders and was far safer. Folded down to pass through doorways, it was rolled from bay to bay. Over 3 times the cost of the Tallescope was saved on this single job. Lightweight, rapidly assembled by one man, Tallescope is 29" wide and extends instantly for reaching heights up to 31 feet.

Write for descriptive circulars

UP-RIGHT SCAFFOLDS

DEPT. 178, 1013 PARDEE, BERKELEY, CALIFORNIA

In Canada: Up-Right Scaffolds, Ltd., 120 Russet Ave., Oshawa, Ontario

GUARANTEED

to give drip-tight leak-proof seal

greates[illegible]e in unions **DART**

For over 55 years the firm guarantee back of each and every DART UNION sold has been — *"if one should leak through we will give you two"!* The record reveals that less than 1 in every 100,000 has proven to be faulty. The extra wide bronze to bronze seats, precision ground to a true ball joint, mounted in heavy malleable iron pipe ends and protected by an extra heavy union nut, make a drip-tight, leak-proof connection WITHOUT EXCESSIVE WRENCHING time and time again.

Guarantee positive tight connections and extra long service on your pipe lines by using the DART GUARANTEED UNION.

Yours on request: Descriptive brochure on Dart Unions and Union Fittings.

DART UNIONS *Products of* **DART UNION COMPANY** PROVIDENCE, R. I.

GENERAL SALES AGENT

THE **Fairbanks** COMPANY
393 LAFAYETTE STREET, NEW YORK 3, NEW YORK
BRANCHES: NEW YORK 3
PITTSBURGH 22 • BOSTON 10 • ROME, GEORGIA

For more facts Circle 482 on Reader Service Card

COULD THIS HAPPEN IN YOUR PLANT?

VALDURA EPO-SURFACER

eliminates dangerous concrete cracks!

Pits and cracks in concrete floors that can cause serious bodily injury from falls and costly damage to machine parts *can be eliminated* with Valdura's Epo-Surfacer. This 100% solids Epoxy product provides a "slip-proof" coating for floors, stairs, ramps, tank cars. A thin film — only ⅛" thick — can be applied, cured, and be ready for use overnight.

Mail coupon for a FREE trial in most troubled area in *your* plant.

FREE

Contact me about patching an area in our plant with Epo-Surfacer — at no charge to us.

VALDURA Heavy-Duty PAINT DIVISION
AMERICAN-MARIETTA CO., CHICAGO 11, ILLINOIS

NAME.....
COMPANY.....
ADDRESS.....
CITY..... STATE.....

HANDBOOK OF INSTRUMENTATION and CONTROLS

A practical manual for the mechanical services covering steam plants, power plants, heating systems, air-conditioning systems, ventilation systems, diesel plants, refrigeration, and water treatment. **By H. Kallen, Kallen & Lemelson, Consult. Engrs. 666 pp., 520 illus. & charts, $15.00**

SUCCESSFUL MANAGERIAL CONTROL BY RATIO-ANALYSIS

Fully describes how to develop and apply the concept and techniques of ratio-analysis in a wide variety of business situations and industries for more effective management control. **By S. Tucker, Martin & Tucker. 415 pp., 191 illus., charts, and tables, $11.00**

MANAGEMENT AND CORPORATIONS, 1985

Sixteen authorities explore economic and social changes that will significantly affect corporations, managers, and their decisions during the next 25 years. Discusses computers, corporate power, ethics, and more. **By M. Anshen and G. Bach, Carnegie Inst. of Tech. 264 pp., $5.50**

SMALL PLANT MANAGEMENT

This guide to practical, know-how management provides up-to-date information on management techniques for application in small plants or technical service units. **Edited by W. MacCrehan, Jr., ASME. 2nd Ed. 560 pp., 43 illus. $10.50**

TOP MANAGEMENT HANDBOOK

Sixty of today's most distinguished executives express their personal approach in the daily practice of management, treating key functions both of chief executives and activity-area managers. **Edited by H. B. Maynard, H. B. Maynard & Co., Inc. 1248 pp., 146 illus., $17.50**

THE GREAT ORGANIZERS

Describes the methods used by the master organizers of Du Pont, General Motors, National Steel, and Westinghouse who skillfully led their companies to new heights of success. **By E. Dale, Ernest Dale Assoc. 271 pp., $5.95**

10 DAYS' FREE EXAMINATION

McGraw-Hill Book Co., Dept. FAC-1
327 W. 41st St., New York 36, N. Y.

Send me books(s) checked below for 10 days' examination on approval. In 10 days I will remit for book(s) I keep plus few cents for delivery costs, and return unwanted book(s) postpaid. (We pay delivery costs if you remit with this coupon—same return privilege.)

- ☐ Kallen—**Hdbk. of Instru. & Controls**—$15.00
- ☐ Tucker—**Succ. Mgrl. Cntrl. by Ratio-Anal.**—$11.00
- ☐ Anshen & Bach—**Mgmt. & Corp., 1985**—$5.50
- ☐ ASME—**Small Plant Management**—$10.50
- ☐ Maynard—**Top Management Hdbk.**—$17.50
- ☐ Dale—**The Great Organizers**—$5.95

Name .....
Address .....
City ..... Zone..... State.....
Company .....
Position .....
For price and terms outside U.S. write McGraw-Hill Intl., N.Y.C. 36 FAC-1

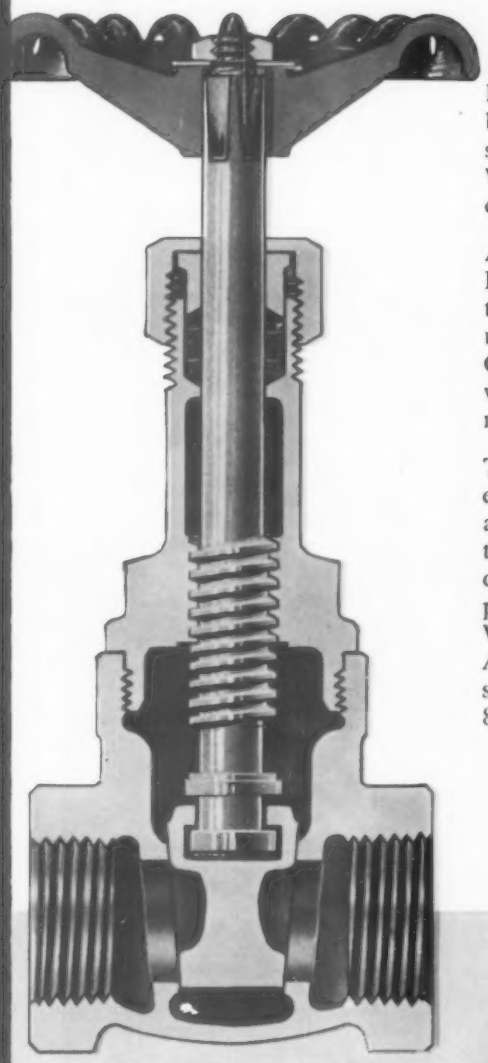
For more facts Circle 483 on Reader Service Card

For more facts Circle 484 on Reader Service Card ➤

STEAM — WATER — OIL — GAS

QUALITY BUILT INSIDE...OUTSIDE

Williams Bronze Valves

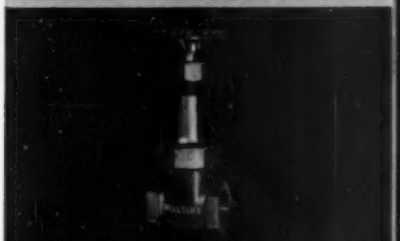


Engineers who have the responsibility for the control of liquids or steam in their plants, specify Williams bronze valves. Reason — dependability.

And the inherent dependability of D. T. Williams valves is because of the extreme quality control measures used by the American-Standard® Controls Division. Quality begins with materials—extends through all manufacturing operations.

The Williams line is broader than ever with the seven new valves announced in the last year. All of them have been designed to resist distortion, and withstand piping and pressure strains. See them at your Williams wholesaler, or write American-Standard Controls Division, 5900 Trumbull Avenue, Detroit 8, Michigan.

Figs. 1253 and 1254—"Fed-Stan®" rising stem-gate valves. Screwed bonnet. Bronze tapered solid disc, integral seat. Meet Federal Specs. WW-V-54, Type II, Classes A and B, respectively. Screw ends—125 lb. (Fig. 1253) and 150 lb. (Fig. 1254) S.P. Sizes, ¼"-3".



Figs. 129 and 976—Rising stem gate valves. Union bonnet. Bronze tapered solid disc, integral seat. Screw ends—200 lb. (Fig. 129) and 300 lb. (Fig. 976) S.P. Sizes, ¼"-3".

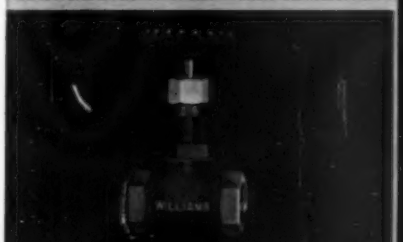


Fig. 50—Globe valve. Meets Federal Specs. WW-V-51, Class A, Type 1. Renewable bronze disc, integral seat, 125 lbs. S.P., and non-shock water, oil or gas to 200 lbs. at 150° F. Sizes, ⅛"-3".

Fig. 1308—Rising stem gate valve. Union bonnet. Bronze tapered solid disc, integral seat. Screw ends—150 lb. S.P. Sizes, ¼"-3".

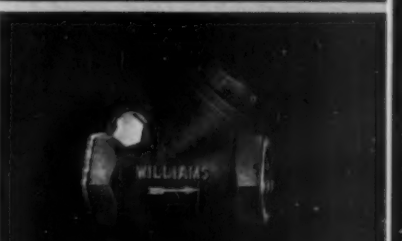


Fig. 65—Swing check valve. Screwed cap. Renewable bronze disc, integral seat. Screw ends—125 lb. S.P. Sizes, ¼"-3".

GUARDIANS OF THE PIPELINES
D.T. Williams VALVES

American-Standard and Standard® are trademarks of American Radiator & Standard Sanitary Corporation.

AMERICAN-Standard
CONTROLS DIVISION

SEE US IN BOOTH NO. 955 AT PLANT MAINTENANCE SHOW

"KEX" Industrial Towel Rental Service
HELPS UNITED AIR LINES KEEP 'EM FLYING

Keeping fast jets in top condition and maintaining tight operating schedules call for maximum cleanliness in shops where planes are serviced. For complete cleaning dependability in heavy maintenance jobs as well as for delicate precision equipment, United Air Lines' Engineering and Maintenance Division at San Francisco uses "KEX" Industrial Towel Rental Service.

The aircraft, automotive, food processing, oil, and steel industries are only a segment sold on "KEX" Industrial Towel Rental Service. For over 30 years, "KEX" has served Industry large or small with the most efficient, effective and economical means of handling its wiping material requirements. "KEX" Rental Service is tailored to fit your plant operation.

"KEX" is a registered trademark of Callaway Mills Company, manufacturers of famous Label of Luxury towels, carpets, and scatter rugs—at fine stores everywhere. "KEX" Service is provided nation-wide by franchised local distributors. United Air Lines is supplied by Shop Towel Service & Supply, So. San Francisco, Calif. For further details, look under "Wiping Towels" in the Yellow Pages. Or write "KEX" National Service, 295 Fifth Avenue, New York 16, N. Y.

"KEX"®

"KEX" TOWELS ARE MADE IN THE U.S.A.

NATIONAL SERVICE

295 Fifth Avenue, New York 16, N. Y.

IT ISN'T "KEX" UNLESS IT'S IMPRINTED "KEX"

PRODUCTS EXHIBITED

Begins on page 136

PRODUCT	BOOTH
Ramset Fastening System	522
Fastening tools, hammers.	
Rapids-Standard Co., Inc.	904
Angle-iron cutter.	
Ridge Tool Co.	801
Pipe wrenches, reamers, extractors, threaders, vises, cutters, flaring tools*, chain wrenches*.	
Tool & Mfg. Co., Inc.	317
Cutting chisels.	
U. S. Expansion Bolt Co.	638
Anchoring tools and supplies.	
Vaco Products Co.	515
Screw drivers.	
Victaulic Co. of America	1055
Pipe tools.	
Wheeler Mfg. Corp.	890
Manual and hydraulic pipe cutters.	

TOOLS—PORTABLE POWER

Airetool Mfg. Co.	738
Tube cleaners and expanders, pneumatic drills, grinders, screwdrivers, nut-setters, sanders, impact wrenches*, and chipping hammers*.	
Arcair Co.	892
Metal cutting and gouging torches, carbon welding products, welding accessories.	
Richard C. Bennett Mfg. Co.	115
Two-way panel saw.	
Black & Decker Mfg. Co.	1065
Sabre saw* and blades*, 1¼-in. two-speed drill*.	
Blackhawk Industrial Div.	745
Mechanical and hydraulic tools: conduit benders, knockout punches, pullers.	
Chamor Mfg. Corp.	120
Wire pulling machine, bender.	
Fenway Machine Co., Inc.	613
Electric and pneumatic cutting tools.	
Hein-Werner Corp.	608
Hydraulic and remote control jacks, pipe benders.	
Kollmann Mfg. Co., Inc.	1020
Electric, gasoline,- or air-powered pipe and drain cleaning equipment.	
Millers Falls Co.	868
Power tools, sanders, saws, and shock-proof drill*.	
Milwaukee Electric Tool Corp.	958
Drills, saws, grinders, screwdrivers, shears, hammers, polishers.	
Nye Tool Co.	1045
Power threader*.	
O'Brien Mfg. Corp.	407
Sewer cleaning machines.	
Porter-Cable Machine Co.	539
Electric band, circular, bayonet* saws; drills*; sander-grinders; hammers.	
H. K. Porter, Inc.	876
Hydraulic and pneumatic cutting tools.	
Ridge Tool Co.	801
Pipe and bolt threading machines, power drives.	
Sileps, Inc.	572
Hammer and powder-actuated stud drivers and tool studs.	
Skil Corp.	900
High-torque*, high-speed*, and recipro-	

* *Shown for the first time*

HALLOWELL

OPEN BENCHES

are just right!

basic open bench
with single drawer
with top shelf, backboard, end pieces, single drawer, tie bars
with two 2-drawer units
with two shelves, single drawer
with backboard, end pieces and three single drawers
with top shelf, backboard, end pieces, two 2-drawer units, footrest
with top shelf, two 3-drawer units
with three shelves
back to back, single drawers, common top shelf
with two 3-drawer units, footrest
with laminated wood top, electrical panel.

Look over these typical Hallowell benches. Only Hallowell offers such a variety of lengths, widths, tops, heights, and so many accessories. And best of all, no long waits for expensive custom-designed benches!

Mail coupon today for FREE Catalog

COLUMBIA-HALLOWELL Division SPS
Jenkintown 11, Pa.

Please send me the Hallowell bench catalog.

Name.....
(Please Print)

Company.....

Address.....

City.....Zone....State.....

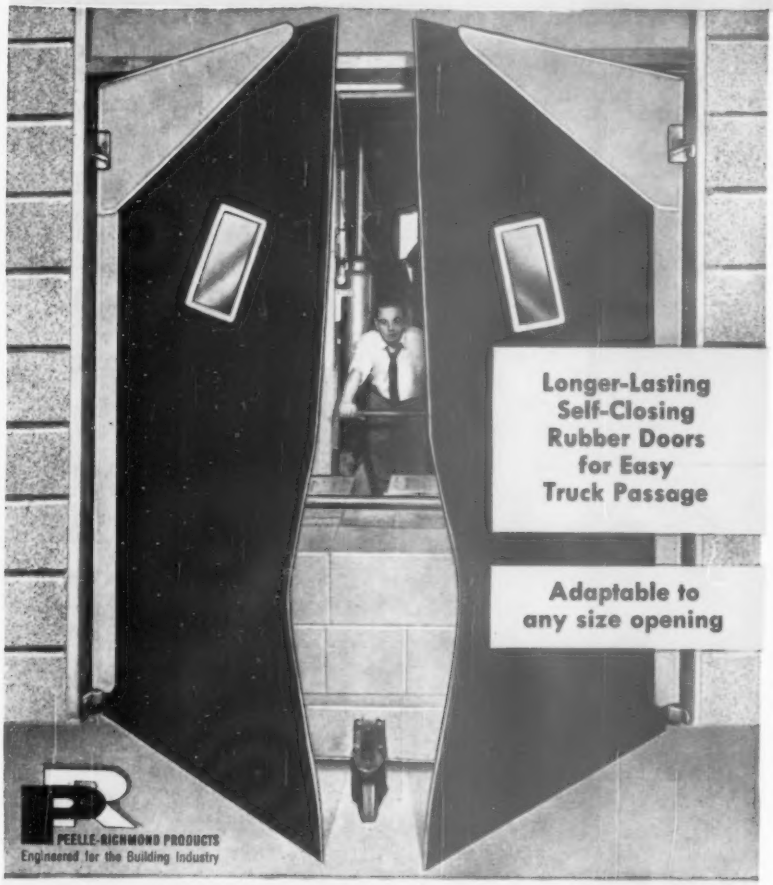
2103, 2299

COLUMBIA-HALLOWELL Division SPS JENKINTOWN 11, PA., SPS WESTERN, SANTA ANA, CAL.

where reliability replaces probability

For more facts Circle 486 on Reader Service Card

PEELLE
FLEX-A-MATIC DOORS


Longer-Lasting Self-Closing Rubber Doors for Easy Truck Passage
Adaptable to any size opening
PEELLE-RICHMOND PRODUCTS
Engineered for the Building Industry

See these Doors at Booth 970
1961 Plant Maintenance & Engineering Show

Durable, easy-opening FLEX-A-MATIC Doors are made of tough 2-ply rubber which *gives* upon impact. Fork lift trucks and hand trucks pass through them quietly—without the usual noisy impact that damages doors, trucks and goods. The whole surface absorbs shocks, no matter where trucks bang into it. Outlast rigid doors many times.

Simple, rugged construction, with nothing to get out of order, makes these doors low in price and low in maintenance cost. Sturdy cam hinges are self-returning and trouble-free. Strongly built with number 11 ga. steel frames and Plexiglas vision panels.

They are used by many of America's largest industrial companies, some of which have already re-ordered. Among those which re-ordered are E. R. Squibb, New York Daily and Sunday News, A&P and General Motors.

Send size of opening for price.

THE PEELLE COMPANY, 47 Stewart Ave., Brooklyn 37, N. Y.

PRODUCTS EXHIBITED

Begins on page 136

PRODUCT — **BOOTH**

cating* saws; hammers; screwdrivers; and nutrunners.

Stanley Electric Tools Div., Stanley Works 1028
Portable electric maintenance tools, impact masonry drill, all-purpose saw.

Stewart-Warner Corp., Industrial Electronic Balancer Dept. 560
Portable balancers.

Templeton, Kenly & Co. 201
Remote controlled rams.

Wells Mfg. Corp. 615
Electric hand saws.

UTILITY AND AUXILIARY EQUIPMENT

Blackhawk Industrial Div. 745
Electric-hydraulic pumps.

Dean Products, Inc. 447
Heat transfer coils and plates.

Dean Brothers Pumps Inc. 950
Industrial pumps, systems.

Davey Compressor Co. 790
Rotary, reciprocating air compressors.

Eriez Mfg. Co. 520
Non-electric separation equipment, magnetic conveying units*, vibratory feeders and bin vibrators, plate magnets, magnetic grates, pipeline traps, pulleys.

Filterite Corp. 555
Filters and clarifiers.

Fuller Co. 114
Rotary compressor.

Johnson Corp. 931
Aftercoolers, boiler-feed pumps.

Kenco Pump Div., American Crucible Products Co. 941
Gas-driven, sump, and bilge pumps.

Lincoln Engineering Co. 804
Air compressors.

Purolator Products, Inc. 545
Oil, air, and fuel filters.

A. O. Smith Corp. 409
Industrial water heaters.

Tranter Mfg., Inc., Platecoil Div. 814
Heat transfer plates and coils.

Van Products Co. 917
Compressed-air dryer.

Vanton Pump & Equipment Corp. 878
Plastic pumps.

Wandel Machine Co., Inc. 404
Waste disposal system.

Edwin L. Wiegand Co. 951
Electric heating equipment for coolant, lubricant, cleaning, degreasing and plating temperatures; controlled core drying, heat-treating and annealing; comfort heating equipment, liquid heat transfer equipment, infra-red ovens.

VALVES, PIPING, FITTINGS

Acme-Hamilton Mfg. Corp. 757
Hose for all maintenance applications.

Aeroquip Corp. 700
Flexible hose and re-usable fittings; self-sealing couplings; adapters.

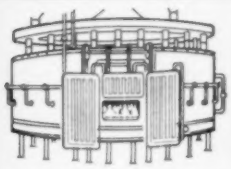
* *Shown for the first time*

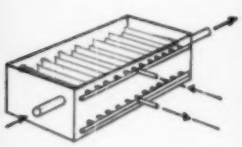
Turn the page

PLATECOIL®

ADAPTS TO YOUR HEAT TRANSFER PROBLEM

a wide variety of designs and sizes





ALL TYPES OF TANK AND PROCESS HEATING AND COOLING

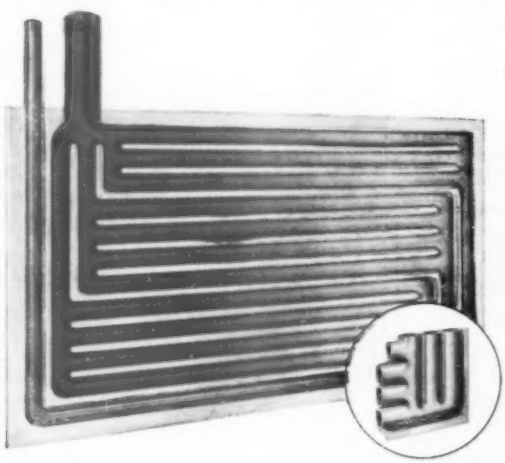
OVEN AND FURNACE USES

EXTERNAL OR INTERNAL MOUNTING

WASTE HEAT RECOVERY

PLATECOIL is the versatile, factory fabricated answer to heat transfer problems of all kinds. You can apply PLATECOIL to all types of tank and process heating and cooling — open tanks, closed tanks, agitated tanks, deep tanks, jacketed tanks, sumps, kilns, ovens and many others. Basic PLATECOIL types include header and serpentine designs in single embossed, double embossed, flat, rolled and banked units. They are available in mild steel, stainless steel, Monel, Ni-o-nel, Hastelloy B, Hastelloy C, nickel, and many other metals. Special designs, surface finishes, structural parts and connections add to their versatility. Operating pressure now rated up to 250 psi.

NEW MULTI-ZONE* PRINCIPLE PRODUCES MORE EFFECTIVE HEAT TRANSFER



Multiple headers with multiple condensate returns provide better steam distribution and more total effective heat transfer area in the new MULTI-ZONE PLATECOIL. FREE-FLO action, without condensate trapping increases processing production through faster "start-up" and extremely fast temperature recovery. This reserve capacity also holds temperature variations to a minimum. PLATECOIL eliminates problems of engineering, fabricating, installing and maintaining pipe coils. PLATECOIL units are lightweight and easy to handle. They are compact and save tank space. Deposits do not build up on streamlined PLATECOIL surfaces as they do on pipe coils. All stainless steel and alloy PLATECOIL units affected by cold working are annealed and pickled after fabrication to return the metal to its original condition and thus eliminate the probability of corrosion due to internal stresses and carbide precipitation. PLATECOIL is also relatively simple and economical to remove, clean and re-install. In most cases there is no need for threaded joints within the solution to corrode or leak.

Investigate the possibilities of PLATECOIL for your specific problem.

*Patented

Send for Bulletin P60 for more data.

Tranter Manufacturing, Inc.

LANSING 9, MICHIGAN

PLATECOIL® DIVISION

LITTLE THINGS MAKE ROYAL EQUIPMENT GREAT

— and keep output high all day long

A Royal chair may look like others—but not to the worker who sits on one all day. A case in point—Model 515 above—America's foremost production stool. Its uncluttered lines hide a dozen features that help posture, comfort, and efficiency . . . the big, contoured, 4-way adjustable back is mounted on spring steel to respond to the slightest body movement . . . the legs telescope for height adjustment . . . no protrusions to cause injuries . . . ■ There are dozens of Royal chairs and stools for industry. Each the best for its specific purpose. ■ The same holds true for Royal cabinets. All corners are rounded, all hinges and fastenings concealed. The extra heavy gauge panels are flush finished. Doors are rigid, shelves are adjustable and every cabinet is ventilated. Write today for full details. ■ ROYAL METAL MANUFACTURING COMPANY, Dept. 27-A, One Park Ave., New York 16, N. Y. In Canada—Galt, Ontario.

Royal®
INDUSTRIAL EQUIPMENT

PLANT MAINTENANCE AND ENGINEERING SHOW — BOOTHS 835 AND 837

PRODUCTS EXHIBITED

Begins on page 136

PRODUCT	BOOTH
Anaconda Metal Hose Div., Anaconda American Brass Co.	**649**
Flexible hose and tubing, coolant lines, connectors for liquid lines.	
Armstrong Machine Works	**927**
Steam, air, and air relief traps; humidifiers; strainers; gas purgers.	
Atlantic Metal Hose Co., Inc.	**455**
Flexible metal hose and couplings; Teflon hose assemblies and fittings; and pump connectors.	
Band-It Co.	**913**
Clamps, hose nipples and couplings, brackets, air tools.	
Barco Mfg. Co.	**635**
Flexible ball joints; swivel, rotary, and swing* joints.	
A. M. Byers Co.	**625**
PVC and wrought-iron pipe.	
Chiksan Co.	**831**
Swivel joints, plug valves, and unions; truck and tank car loading arms; line blinds.	
Colonial Plastics Mfg. Co.	**1049**
Plastic pipe and fittings. PVC sewer pipe and fittings.	
Continental-Emsco Co., Div. of Youngstown Sheet & Tube Co.	**754**
Swivel joints.	
Detroit Controls Div., American-Standard	**955**
Gate, globe, and check valves.	
Duriron Co., Inc.	**530**
Plug valves.	
Fairbanks Co.	**476**
Pipe fittings, unions, valves.	
Fibercast Co., Div. of Youngstown Sheet & Tube Co.	**754**
Glass-reinforced epoxy resin pipe and fittings.	
Flexible Tubing Corp.	**1128**
Flexible non-metallic tubing for dust and fume removal, ventilating and material handling.	
Flexonics Corp., Subsidiary of Calumet & Hecla, Inc.	**220**
Flexible metal hose, expansion joints, pipeline motion compensators, anchors, guides, supports.	
Homestead Valve Mfg. Co.	**1022**
Plug valves, boiler blow-off valves.	
Imperial-Eastman Corp.	**542**
Tubing; tube fittings; valves; cutting, flaring, and swaging tools.	
Johnson Corp.	**931**
Rotary joints, traps, solenoid- and diaphragm-operated valves, compressed-air and steam separators.	
Lincoln Engineering Co.	**804**
Air line quick-connect couplers and fitting accessories.	
Lunkenheimer Co.	**830**
Bronze, iron, steel valves; PVC valves; and cocks.	
Parker-Hannifin Corp.	**109**
Hose and tube fittings.	
Punch-Lok Co.	**626**
Hose clamps and fittings.	
Robvon Backing Ring Co.	**1053**
Tube welding backing rings.	

* *Shown for the first time*

Turn the page

For more facts Circle 490 on Reader Service Card

3 Ways to Increase Production

1 PROVIDE PARTS CLEANING SOLVENT CANS AT THE MACHINE

Keep machinists doing **productive** work—eliminate unnecessary trips to centrally located parts cleaning station. Machine Bench Can attaches to machine or bench. Depressing fire safe Dasher dips parts; releasing pressure returns parts for draining. 10" x 7" x 8" deep; Capacity 2 gallons.

2 CLEAN SMALL PARTS AT WORK STATION IN AIR OPERATED MACHINES

Clean small machined parts in flammable solvents safely and automatically with Protectoseal Air-Matic Parts Washers. Require no attention from operator during wash cycle. Parts in basket are moved **through** solution to provide effective cleaning action. Operate on 35 psi. Cap. 6 gal; 30 lb. basket load; 15" x 15" x 25½" deep.

3 APPLY FLAMMABLES WITH AUTO MATIC PLUNGER CANS

Use automatic, fire safe Protectoseal Applicating Cans for assembly or cleaning operations requiring use of flammable solvents. Depressing dasher pumps a measured quantity of solvent into dasher cup to dampen swab, brush, or sponge. Saves time, solvent, reduces toxic or explosive vapor hazard. Made in 7 sizes; capacities to 2 gallons of solution.

Write for Protectoseal Catalog of fire-safe products for handling, dispensing, and use of flammable liquids in production operations.

THE PROTECTOSEAL COMPANY
1962 S. Western Ave. • Chicago 8, Illinois

Circle 488 on Reader Service Card

NEW...Tennant *Electric* Sweeper

SO QUIET you hardly hear it . . . so efficient it gets dirt other sweepers miss . . . so economical it often pays for itself in a year!

The new TENNANT "80-E" is all this . . . and *more*. It's exclusively "aisle-designed" to clean aisles up to 8½ ft. wide in one round trip. And in open areas it easily sweeps over 90,000 sq. ft. per hour. Cleans a 53" path with side-brush, 42" without.

You'll like its dependable battery power. Easily sweeps a full shift on a single battery charge (under normal operating conditions).

Economical. A real money-saver, too. Electricity usually costs less than other power. Upkeep is less. And an electric sweeper will generally last longer . . . especially when operating under dusty conditions.

WRITE TODAY *for illustrated bulletin.* G. H. TENNANT COMPANY, 759-D N. Lilac Drive, Minneapolis 22, Minnesota.

TENNANT

Industry's Most Widely Used
POWER SWEEPERS

Model 100 Sweeper cleans 7'4" path

Model 53 Sweeper cleans 40" path

Model 40 Sweeper cleans 34" path

SPECIALIZED MAINTENANCE EQUIPMENT

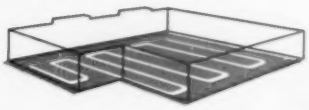
For more facts Circle 489 on Reader Service Card

with

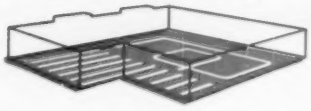
Faultless Casters

You Can Utilize Production Space Efficiently . . . and Change Plant Layout as Needed!

Today, your production line can move in a serpentine pattern



. . . tomorrow it can be changed to a straight-line or circular flow



A fluid Faultless Castered production line is quickly reshaped as needed . . . to suit new products, design changes, retooling, time-and-motion study recommendations, etc. Also Faultless Castered trucks, dollies, racks, carts can transport your manufactured products outdoors for yard stocking. Whatever your production line load requirements, floor surfaces, space limitations, Faultless engineers the precision casters to meet your specific requirements and limitations.

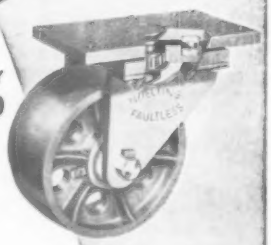
ASK YOUR DISTRIBUTOR: Your nearby Faultless Industrial Distributor maintains a substantial inventory of Faultless Casters for immediate delivery. He and one of the strategically located Faultless Sales Engineers are available to work with you on every handling problem in your plant. Or write for complete information.

GENERAL DUTY SERIES 100 CASTER

LIGHT DUTY SERIES 400 CASTER

MEDIUM DUTY SERIES L900 CASTER

HEAVY DUTY SERIES H900 CASTER



EXTRA-HEAVY DUTY SERIES 1300 CASTER

NOELTING Casters

Faultless Caster Corp.

Evansville 7, Indiana

Branch Offices in principal cities; see the Yellow Pages of the telephone book under "Casters". Canada: Stratford, Ontario

PRODUCTS EXHIBITED

Begins on page 136

PRODUCT	BOOTH
Rockwood Sprinkler Div., Gamewell Co.	108
Unions, manual and power-operated ball valves.	
Rotherm Engineering Co., Inc.	1035
Revolving and expansion joints.	
Stockham Valves & Fittings	750
Iron, steel, and bronze fittings and valves; non-lubricated plug valves.	
Strong, Carlisle & Hammond Div., White Sewing Machine Corp.	450
Steam and vacuum traps, strainers, separators, reducing and continuous blow-down valves.	
Titeflex, Inc.	726
Flexible metal and Teflon hose, hydraulic rubber hose*, quick-disconnect couplings, tool for attaching fittings*.	
Vanton Pump & Equipment Corp.	878
Plastic gate valves, pipe, fittings.	
Victaulic Co. of America	1055
Valves, pipe couplings, and fittings.	
Walworth Co.	441
Gate, globe, and check valves in bronze, iron, and steel; bronze solder joint valves; lubricated plug valves; and PVC (plastic) products.	
Weatherhead Co., Ft. Wayne Div.	1004
Tube and pipe fittings, re-usable hose ends, hose assemblies, plastic tubing and inserts, seal-nuts.	
Worcester Valve Co., Inc.	554
Ball valves.	
Yarnall-Waring Co.	665
Blow-off valves, expansion joints, steam traps.	

VIBRATION MOUNTS

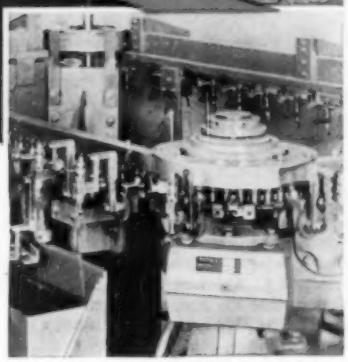
Anaconda Metal Hose Div., Anaconda American Brass Co.	649
Pipe vibration eliminators.	
Clark, Cutler, McDermott Co.	962
Vibration dampening pads, mounts that bolt to machine or floor*.	
Flexonics Corp., Subsidiary of Calumet & Hecla, Inc.	220
Vibration eliminators.	
Korfund Co., Inc.	501
Vibration damping material, vibration absorbing machinery mounts.	

WASHROOM FACILITIES, DRINKING FOUNTAINS

Ebco Mfg. Co.	861
Hot and cold water coolers, wall-mounted water cooler*.	
Industrial Wiping Cloth Co., Inc.	842
Safety slogan towels, shop towels and dispensers.	
Steiner Co.	514
Paper towels, napkins, toilet tissue; toilet tissue dispenser and roll paper-towel cabinets.	
U. S. Borax & Chemical Corp.	576
Soap dispensers.	
Westinghouse Electric Corp., Water Cooler & Dehumidifier Dept.	506
Water coolers.	

* *Shown for the first time*

Shortest "buy-way" between planning and finished product



. . . standardized parts from stock at local Distributors

When you can get gears, speed reducers, chain and sprockets, bearings and other products of BOSTON Gear quality *off-the-shelf*, at factory prices, from local stocks — why wait for "specials"? Compare costs, and you'll see that "standardization pays" right down the line.

You simplify the design job . . . select components needed from the BOSTON Gear Catalog . . . order all from one local source . . . and get products top-rated for performance and service life.

You save on inventory expense . . . get supplies as needed from Distributors' full stocks. With BOSTON Gear components in products you make and sell, you protect your customers against replacement delays and downtime. Anywhere in industrial U. S. or Canada, there's a BOSTON Gear Distributor nearby to make prompt delivery.

Call your Distributor, and learn how his factory-trained specialists can make "standardization pay" most for you. Boston Gear Works, 62 Hayward Street, Quincy 71, Massachusetts. *Adv. copyright by Boston Gear Works*

CALL YOUR NEARBY BOSTON Gear® DISTRIBUTOR

For nearest Distributor see "Yellow Pages"

— STANDARDIZATION PAYS —®

For more facts Circle 494 on Reader Service Card

COMPLETE CONFERENCE PROGRAM

The best brains in the maintenance and plant engineering field have been marshalled for these conferences. All morning sessions are at the International Amphitheatre. Evening sessions are at the Palmer House. Attendance is by paid registration only.

Monday, Jan. 25, 10 a.m.

1. The Design, Application, and Results of Our Maintenance and Engineering System (a case study)—Chairman: L. C. Morrow, consulting editor, FACTORY, New York, general chairman of the conference. Speaker: John M. Link, chief, Plant Department, Burlington Shops, North Carolina Works, Western Electric Co., Burlington, N.C.

Monday, Jan. 23, 7:30 p.m.
Concurrent Sessions
(2 through 11 are repeated)

2. Scope of the Plant Engineering Function—Chairman: Harley R. Hughes, manager, Plant Engineering Services, Colgate-Palmolive Co., New York. Speaker: W. E. Fore, plant engineer, Los Angeles Div., North American Aviation, Inc., Los Angeles.

3. The Plant Engineer's Responsibility for Building Design and Construction—Chairman: F. R. Malmgren, manager of buildings and maintenance, A. B. Dick Co., Chicago. Speaker: John M. Connelly, plant engineer, Royal McBee Corp., Springfield, Mo.

4. Upkeep of Electronic and Other Control Instruments—Chairman: James W. Fulton, shop manager, Electrical Shop, R. J. Reynolds Tobacco Co., Winston-Salem, N.C. Speaker: Roy E. Snider, supt. of maintenance and construction, A. C. Spark Plug Div., General Motors Corp., Flint, Mich.

5. Work Sampling, How to Do It, How to Use It—Chairman: W. C. Cooling, Chief Industrial Engineer, Engelhard Industries, Inc., Newark, N. J. Speaker: Philip C. Leahy, asst. manager, Maintenance Branch, Atomic Energy Div., Phillips Petroleum Co., Idaho Falls, Idaho.

6. Welding Filler Materials Useful in Maintenance; Recent Experiences with Unusual Maintenance Welding Jobs—Chairman: Harry Schwartzbart, supervisor, Welding Research, Armour Research Foundation of Illinois Institute of Technology, Chicago. Speaker: Orville T. Barnett, asst. director, Metals Research, Armour Research Foundation of Illinois Institute of Technology, Chicago, and Willerd Schumbacker, project supt. of welding, Plant Engineering Dept., Allis-Chalmers Mfg. Co., Milwaukee.

7. Accounting for Maintenance Costs—Chairman: George W. Rhine, vice president and editorial director, MAINTENANCE, Cleworth Publishing Co., Cos Cob, Conn. Speakers: Daniel H. Moses, maintenance control engineer, Merck Sharp & Dohme Research Laboratories Div., Rahway, N. J., and R. Z. Trimble, supervisor, Estimating & Control, The Chemstrand Corp., Decatur, Ala.

Sessions 8 through 11
are Round Tables

8. Maintenance in Automobile Plants—Discussion Leader: D. A. Kerry, manager, Plant Engineering Dept., Transmission and Chassis Div., Ford Motor Co., Livonia, Mich.

9. Maintenance in Chemical Processing Plants (Problem Session)—Discussion Leader: Herbert H. Wiggins, supervising engineer in charge of plant maintenance, Goodrich-Gulf Chemicals, Inc., Institute, W. Va.

10. Maintenance in Electronic Equipment Manufacturing Plants—Discussion Leader: H. Warren Gieffers, works manager, Consumer Goods and Automotive Divs., Motorola, Inc., Franklin Park, Ill.

11. Maintenance in Textile Mills—Discussion Leader: Harry Barbrey, chief group engineer, Woodside Mills, Greenville, S.C.

Tuesday, Jan. 24, 9:15 a.m.

12. Case Reports in Preventive Maintenance—Chairman: Richard H. Morris, editorial director, PLANT ENGINEERING, Technical Publishing Co., Harrington, Ill. Speakers: Roy A. Anderson, maintenance foreman, Plastics Div., Diamond Alkali Co., Pasadena, Tex., and Charles A. Fenton, supervisor of Machine Tool Maintenance, Tool Design, and Non-Durable Tools & Manufacturing Engineering Sub-Section, Large Motor and Generator Dept., General Electric Co., Schenectady, N.Y.

Tuesday, Jan. 24, 7:30 p.m.
Concurrent Sessions
(13 through 22 are repeated)

13. Insuring Cleanliness in the "White Room"—Chairman: James R. Mildon, corporate plant engineer, Lear, Inc., Grand Rapids, Mich. Speakers: Robert Cash, plant engineer, Semiconductor Components Div., Texas Instruments, Inc., Dallas, and G. E. Schmid, manager, Plant Engineering and Facilities, Kearfott Div., General Precision, Inc., Little Falls, N. J.

14. Planning Maintenance for Automatic and Static Machine Control—Chairman: Dr. R. De Young, supervisory engineer, Systems Control Engineering Dept., Westinghouse Electric Corp., Buffalo. Speaker: O. C. Gochenour, general foreman of maintenance, Aliquippa Works, Jones & Laughlin Steel Co., Aliquippa, Pa.

15. The Pros and Cons of Outside Contracting—Chairman: F. A. Dieter, superintendent of plant engineering, Parke, Davis & Co., Detroit. Speakers: R. B. Beattie, superintendent of engineering, maintenance, and construction, Delaware Refinery, Tidewater Oil Co., Delaware City; W. W. Harris, asst. maintenance and construction superintendent, Humble Oil & Refining Co., Baytown, Tex.; and A. P. Olbrich, chief maintenance consultant, Phillips Petroleum Co., Bartlesville, Okla.

16. Elevating the Maintenance Worker for Administrative Responsibility, and Teaching Supervisors the Principles of Management—Chairman: John G. Allen, coordinator of Process, Supervisory, and Wage-Earner Development, Esso Standard, Div. of Humble Oil & Refining Co., Baton Rouge, La. Speakers: Harry Monroe, general foreman of maintenance, Rocketdyne, Div. of North American Aviation, Inc., Canoga Park, Calif., and Robert P. Bott, director of education and development, Dow Corning Corp., Midland, Mich.

17. Plant Engineering in the Small Plant—Chairman: Clarence F. Petzinger, assistant to vice president of manufacturing and engineering, The Cleveland Twist Drill Co., Cleveland. Speakers: William Irvin Bondurant, plant engineer, The Electric Materials Co., North East, Pa., Matthew A. Simmerman, plant engineer, Merck & Co., Inc., Elkton, Va., and Herbert D. Sprenger, plant engineer, American Standard Industrial Div., Columbus, Ohio.

18. Getting the Most out of Industrial Trucks and Batteries—Chairman: H. E. Hollensbe, editor, PLANT MAINTENANCE AND ENGINEERING, Hitchcock Publishing Co., Wheaton, Ill. Speaker: A. G. McCalden, Jr., material handling engineer, Chevrolet—Central Office, Div. of General Motors Corp., Detroit.

(Sessions 19 through 22
are Round Tables)

19. Maintenance in Cement Plants—Discussion Leader: F. C. Longenbach, maintenance engineer, Alpha Portland Cement Co., Easton, Pa.

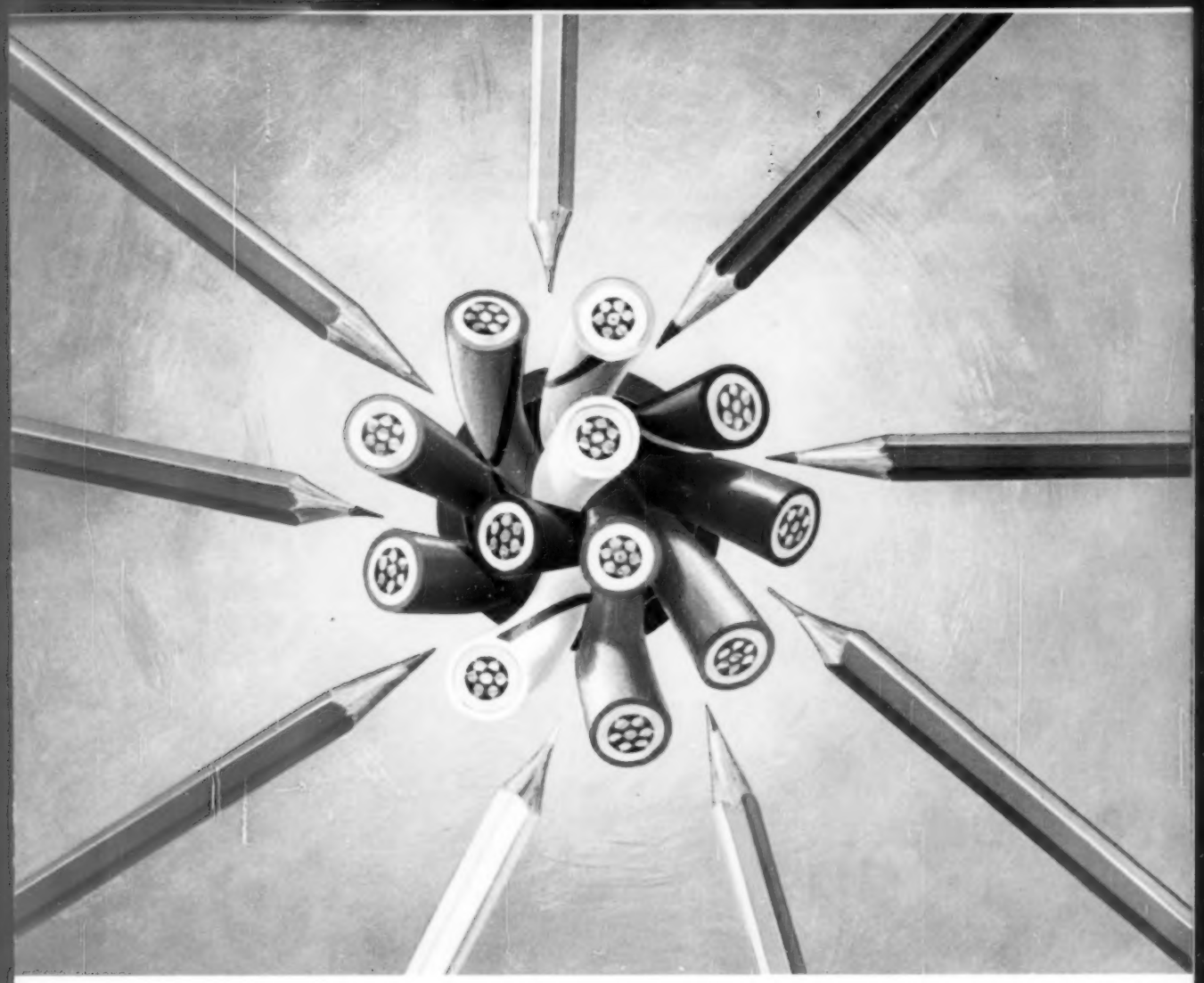
20. Maintenance in Metalworking and Metal Fabricating Plants—Discussion Leader: W. A. Irvine, manager of production engineering, The Maytag Co., Newton, Iowa.

21. Maintenance in Paper Mills—Discussion Leader: Keith C. Martiny, senior engineer, Kimberly-Clark Corp., Neenah, Wis.

22. Maintenance in Petroleum-Processing Plants—Discussion Leader: H. Donald Dobe, maintenance and construction superintendent, Aurora Gasoline Co., Detroit.

Turn to page 178

Circle 495 on Reader Service Card for items on next page



DRAW YOUR OWN CONCLUSIONS

about the versatility of this new, standard control cable from Rome

Start by listing all the factors you consider important in a control cable.

Then compare your list with what Rome's new standard control cable (designated as the CT line) offers. We sum it up in one word: *versatility*—the ability of this new cable to meet most of your control cable needs.

For example, you can use CT cable with either AC or DC circuits. For voltages to 600 there's Type B; to 1000, Type C —both in accordance with new IPCEA-NEMA standards.

How about number of conductors? Specify from 2 to 37, in No. 10 or No. 12 AWG copper. Each conductor is insulated with polyethylene to give you maximum performance in a dielectric material, particularly where *moisture* is a problem. This insulation also stands up to acids, alkalies and oils. So CT is well suited to use in *hazardous* environments.

Over each insulated conductor you also have a Synthinol (polyvinylchloride) jacket. This same material is used to jacket the entire cable. Result: *added* resistance to heat, chemicals, and corrosion. And, good mechanical protection for the insulation, as well as a flame retardant barrier.

Full color coding (in keeping with IPCEA-NEMA, Method I) means you can make correct connections, quickly. And it will save you money in testing and maintenance.

Flexible, clean and light in weight, CT cables are also *smaller* in over-all size than similarly rated rubber-insulated cables. Use smaller conduit and fittings. Put more conductors in existing conduit, or use it in tray or trough.

All the facts and figures about the versatile *new CT cable —including what sizes are available "off the shelf"—are summed up in a 4-page booklet. For your free copy, write to the Rome Cable Div. of Alcoa, Dept. IN-100, Rome, N.Y.*

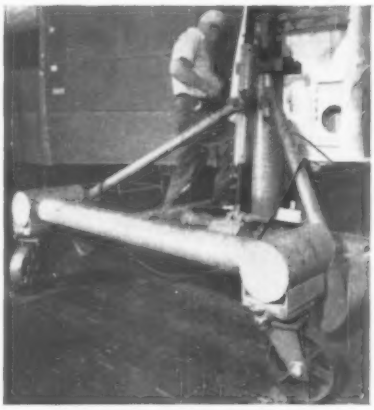
Special requirements? As a cable specialist, Rome can answer any of your control cable problems not met by this standard construction. Ask your Alcoa-Rome salesman for details.

ROME CABLE
DIVISION OF ALCOA

MATERIALS-HANDLING NEWS

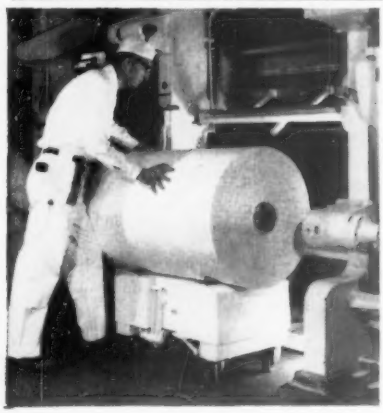
NEW AND UNUSUAL APPLICATIONS OF BASSICK CASTERS THAT MIGHT BE ADAPTED TO YOUR HANDLING PROBLEMS

Grumman "Gulfstream" Assembled on Bassick Casters



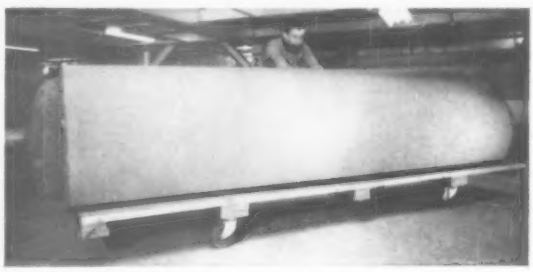
Eight-inch Bassick Series "HA" casters insure easy movement of this rugged stand (right) used for wing assembly of the Grumman "Gulfstream" passenger plane. It's only one of the Bassick-equipped stands used in building the Gulfstream.

Swivel locks on casters and foot-operated Bassick position locks (small photo) fix the stand in position while work progresses. Heavy-duty "HA" swivel casters feature precision unit-type main load and thrust bearings. They can take the abuse of heavy loads under most grueling conditions and continue to combine easy swiveling, smooth rolling, and maintenance economy.



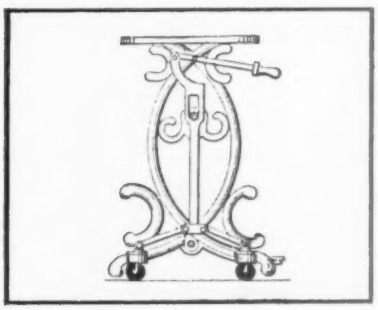
Fine paper gets gentle handling at Kodak

Probably nowhere in the world is paper given such careful attention as at Kodak Park Works of Eastman Kodak Company, Rochester, N. Y., where fine photographic papers are turned out. A man-sized handling job involving a heavy roll of paper is made easy by this special paper-handling dolly. It's equipped with 4" Bassick "77" casters, featuring a rugged one-piece horn and "Diamond Arrow" two-level ball-bearing swivel.



Here's a "dollyful" of easy walking!

At Magee Carpet Company, Bloomsburg, Pa., this carpeting, more than 1000 pounds of it, rolls over floors as smoothly as it will later lie on them . . . thanks to Bassick "H99" casters. "H99's" are the "best-sellers" among high-quality industrial truck casters—bar none. Oversized bearings, heavy frames fit them for roughest usage.



What's new under the sun?

Here's an 1875 illustration of a sewing machine, complete with casters and "position locks."

Today, Bassick's ball-bearing swivel construction and advanced wheel designs make possible the carrying of loads up to thousands of pounds per caster and with far greater protection to floors than our forefathers ever dreamed of!

The high cost of maintenance

. . . continues to amaze us. Did you know that labor charges and lost-time charges for caster replacement *can frequently exceed the cost of the new caster installed?*

It's a fact. And it's a good reason why you should *insist on Bassick casters*—the highest quality available. You'll save in the long run.

Grooved wheels simplify production

They run equally well on floors or simply constructed inverted angle-iron tracks. Tracks permit precise control of motion and Bassick position locks can hold truck or cart rigidly at any location.

See your local distributor. He offers a wide selection of Bassick casters . . . many types in stock for immediate delivery. 1.13

THE BASSICK COMPANY
BRIDGEPORT 5, CONN.
IN CANADA:
BELLEVILLE, ONT.

See our catalog in Sweet's or write for copy

Symbol of SW Excellence

Bassick
A DIVISION OF
STEWART-WARNER CORPORATION

JOY

ELECTRICAL CONNECTORS

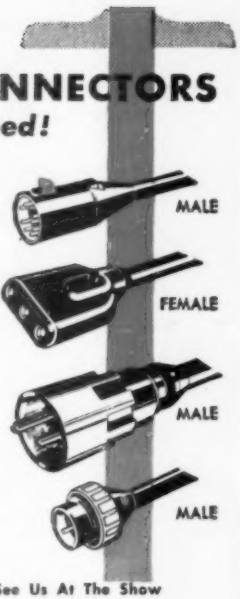
a design for every need!

EQUIPMENT CONTROL DESIGNS
Three basic styles, sizes from 2 to 12 poles. Standard cable lengths, other lengths to order.

OVAL DESIGNS
All-Neoprene rubber watertight power connectors. Choice of 2 through 5 contacts. Maximum rating of 600 volts, 150 amps.

BIGUN DESIGNS
For heavy currents. Threaded bronze couplings, 1 through 4 contacts. Rating of 600 volts. Also attachable Quik-loc designs.

CHANGE-OUT DESIGNS
For fast replacement of production line electrical equipment. 2, 3, 4 conductors type "SO" 600V cord. Cord sizes for loads to 20 amps.



See Us At The Show
Booth 325

WRITE NOW FOR BULLETIN B81 describing designs, features, applications. CD 1105.1

JOY

ELECTRICAL PRODUCTS DIVISION

1245 Macklind Ave., St. Louis, Mo.
Exec. Offices, Henry W. Oliver Bldg., Pgh., Pa.

For more facts Circle 497 on Reader Service Card

Lewis

UNITIZED ASSEMBLY CONTAINERS

FOR
- ASSEMBLY
- PRODUCTION
- STORAGE

Lewis Plastibox containers are one-piece molded plastic. They are smooth, strong, non-corrosive, easily cleaned. Colors, either green or yellow, are molded-in. Plastibox containers stack securely and afford maximum storage of small parts. Sizes available are 8½" long x 5" wide x 4½" deep, 6"x3½"x2½", 3"x3½" x 1¾", and 3"x3½"x1¾" with a vertical divider.

MOUNTING RAILS–Rails are supplied in 18" and 36" lengths to mount 4 or 8 of the 3 smaller Plastibox containers; 3 or 6 of the largest size. Rails afford a wide variety of bench or wall arrangements for any assembly or storage operation.

MOBILE TRUCK ASSEMBLY–These Lewis trucks handle all sizes of Plastibox containers and allow the boxes to be quickly and easily moved from one area to another. Trucks furnished with 36" mounting rails, two swivel and two rigid casters, and are finished in grey enamel.

WRITE TODAY
for complete information and brochure

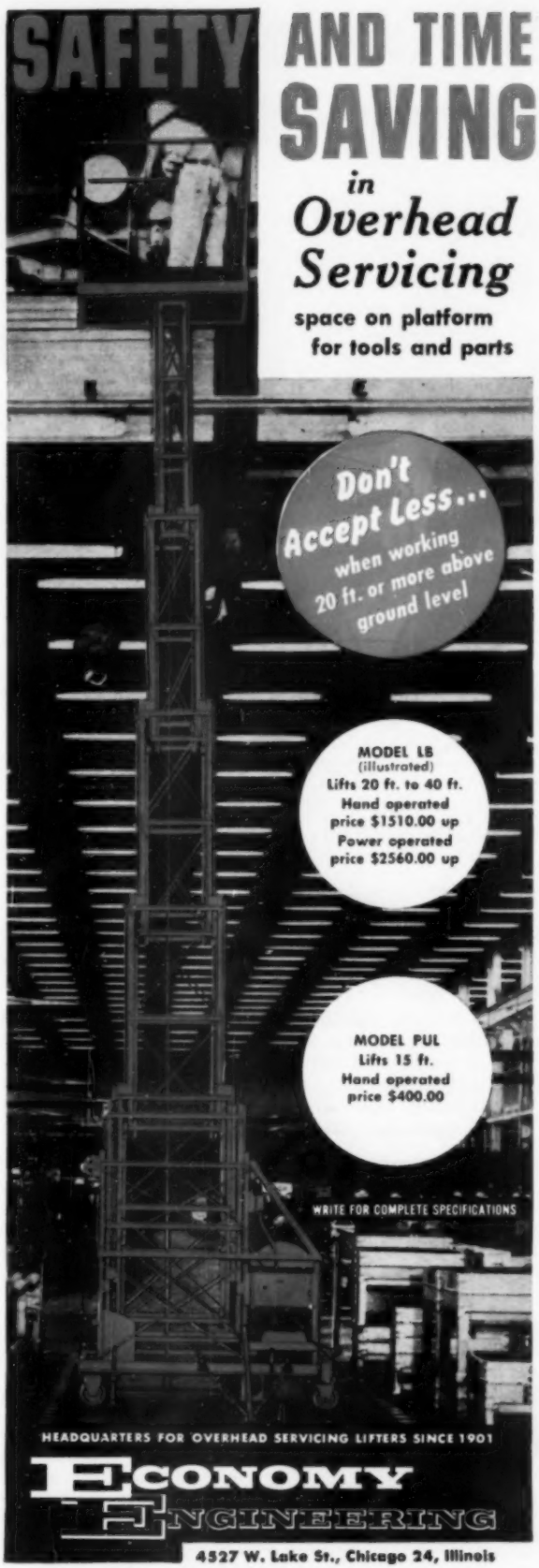
G.B. Lewis COMPANY

121 Montgomery Street • Watertown, Wis.
Shipment within 24 hours from receipt of order.

For more facts Circle 498 on Reader Service Card

SAFETY AND TIME SAVING *in Overhead Servicing*

space on platform for tools and parts


Don't Accept Less...
when working 20 ft. or more above ground level
MODEL LB
(illustrated)
Lifts 20 ft. to 40 ft.
Hand operated price $1510.00 up
Power operated price $2560.00 up
MODEL PUL
Lifts 15 ft.
Hand operated price $400.00
WRITE FOR COMPLETE SPECIFICATIONS

HEADQUARTERS FOR OVERHEAD SERVICING LIFTERS SINCE 1901

ECONOMY ENGINEERING

4527 W. Lake St., Chicago 24, Illinois

For more facts Circle 499 on Reader Service Card

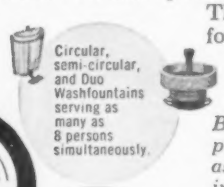
Economy...

that's the real beauty of popular

BRADLEY WASHFOUNTAINS!

Certainly Bradley Washfountains are good-looking. But don't forget about the *money* they save. One Bradley serves 8 people, replacing 8 basins, 16 faucets, and 24 plumbing connections — cutting installation costs 50% or more! One Bradley uses only 9 gallons of water per minute — while 8 basins use 40 gallons.

Bradleys save space, too. One 54" Bradley Washfountain occupies only 56 sq. ft. of space—while 8 basins require 78 sq. ft. In addition, Bradleys save maintenance time and labor . . . and speed traffic flow, conserving manhours. Think of the money that Washfountains would save *your* plant!


Circular, semi-circular, and Duo Washfountains serving as many as 8 persons simultaneously.
Column, partition, and wall-mounted showers serving as many as 5 persons simultaneously.

Bradley

Bradley Washfountains and Showers provide group facilities for as many as 8 and 5 persons, respectively, in industrial buildings of all types and sizes. For additional information, contact your architect, consulting engineer, or plumbing contractor. Or write for free illustrated Publication No. 1418. Bradley Washfountain Co., 2215 West Michigan Street, Milwaukee 1, Wisconsin.

61-107-R1

CONFERENCE PROGRAM

Begins on page 174

Wednesday, Jan. 25, 9:15 a.m.

23. Managerial Controls for Plant and Maintenance Engineers, and Central Maintenance Control of Satellite Plants—Chairman: Richard H. Blair, superintendent of engineering and maintenance, Columbia-Southern Chemical Corp , Subsidiary of Pittsburgh Plate Glass Co., New Martinsville, W. Va. Speakers: Harold A. Stevens, maintenance engineer, Swift & Co., Chicago, and George E. Stone, Jr., administrative assistant, Gemco Manufacturing Co., Genesco, Inc., Nashville, Tenn.

Wednesday, Jan. 25, 10:45 a.m.

24. Evaluation of Plant Engineering and Maintenance Performance—Chairman: Carl G. Wyder, senior editor, plant maintenance and engineering, FACTORY, McGraw-Hill Publishing Co., Inc., New York. Speakers: T. Foulkes, chief plant engineer, The E. B. Eddy Co., Hull, Que., and T. E. Harris, superintendent of maintenance, Parke, Davis & Co., Detroit.

Wednesday, Jan. 25, 7:30 p.m.
Concurrent Sessions
(25 through 34 are repeated)

25. Keeping Ahead of Power System Problems—Chairman: M. D. Robinson, chief electrical engineer, Acme Steel Co. Chicago. Speaker: Leonard R. Hostetter, process and production engineer, Buick-Oldsmobile-Pontiac Assembly Div., General Motors Corp., Linden, N.J.

26. New Materials and Products for Maintenance—Chairman: Charles D. Seeber, supervisor, Maintenance Technical Section, Caterpillar Tractor Co., Peoria, Ill. Speaker: Kenneth N. Banthin, supervisor of construction and maintenance, Visking Co., Div. of Union Carbide Corp., Chicago.

27. Keeping Contamination Out of Air and Water—Chairman: Oscar W. Graveley, technical assistant for maintenance, Union Carbide Metals Co., Div. of Union Carbide Corp., Niagara Falls, N.Y. Speakers: Granville A. Howell, asst. to administrative vice president, Air and Steam Purification, United States Steel Corp., Pittsburgh, and H. W. Poston, regional program director, Water Supply and Pollution Control, Public Health Service, Dept. of Health, Education, and Welfare, Chicago.

28. Controlling Costs by Correct Planning and Scheduling—Chairman: James W. Tracht, asst. chief engineer, Central Engineering Dept. (in charge of Maintenance Section), Pennsalt Chemicals Corp., Wyandotte, Mich. Speaker: Robert W. Snow, mechanical methods program coordinator, Industrial Engineering Div., The Procter & Gamble Co., Cincinnati.

29. Keeping Yards and Grounds the Way They Ought to Be—Chairman: A. K.

Mr. Fanshaw had a *Space-Age* Problem

Mr. Fanshaw was concerned over the conquest of space. Actually, it was lack of space that disturbed him.

His store room was jammed to the gills with drum upon drum of Floor Cleaners. One for asphalt tile, one for rubber, another for terrazzo floors. Sometimes labels peeled off or became illegible and a cleaning crew used the wrong drum. Then Mr. Fanshaw *really* had a problem.

TEXINOL to the Rescue

One day a LEGGE Man called and suggested he use TEXINOL, the *one* Cleaner that does a bang-up job on *all* floors. TEXINOL is recommended for any surface that can't be harmed by water. Besides all types of flooring, that includes metal cabinets, tile walls, lavatories and office furniture. Leaves no soapy film. Needs no rinsing. Can't scratch or mar.

Like other Maintenance Chiefs in leading hospitals and industrial buildings, Mr. Fanshaw now uses TEXINOL *exclusively*. His space problem is solved. What's more, he has the cleanest floors in town! Get the full story on TEXINOL from your LEGGE Floor Specialist. No obligation. Or clip the coupon today.

Walter G. LEGGE Company, Inc.
Dept. A-1, 101 Park Ave., New York 17, N. Y.
Branch offices in principal cities.
In Toronto — J. W. Turner Co.

Send full information on Texinol, the all-purpose Cleaner.

Name_____

Hospital_____

Address_____

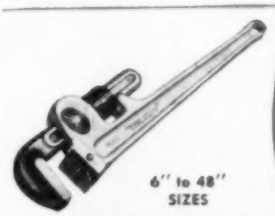
City_____ Zone_____ State_____

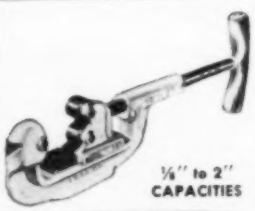
SEE US AT BOOTH #406, PLANT MAINTENANCE SHOW

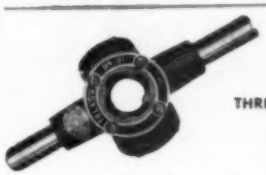
For more facts Circle 501 on Reader Service Card

INSIST ON . . .

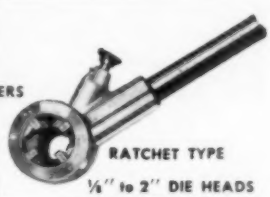
TOLEDO®
Quality Checked PIPE TOOLS
WRENCHES • CUTTERS • THREADERS

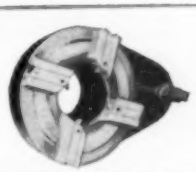

6" to 48" SIZES


⅛" to 2" CAPACITIES


3-WAY TYPE ½" to 1"

THREADERS


RATCHET TYPE
⅛" to 2" DIE HEADS


AUTOMATIC & GEARED CUTTERS

GEARED ADJ. THREADERS

NEW, Advanced Features

Here are a few of many Toledo Quality Checked Pipe Tools with extra values built-in, yet they sell at popular prices. When you see and buy Toledo Pipe Tools you get advanced design and Toledo engineered mechanical features that give you better job performance and long service life. Don't settle for anything less than the best—

INSIST ON TOLEDO!

(SOLD THRU AUTHORIZED "TOLEDO" DISTRIBUTORS)

Write For New Catalog

TOLEDO® *Quality Checked*

PIPE THREADERS • WRENCHES • MACHINES • TUBING TOOLS

THE TOLEDO PIPE THREADING MACHINE CO...TOLEDO 3, OHIO

For more facts Circle 502 on Reader Service Card

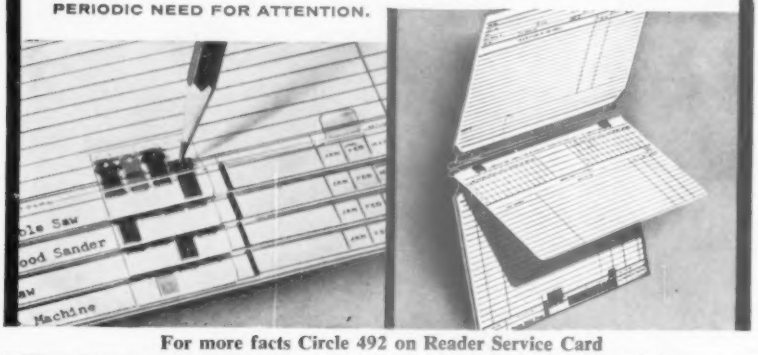
You never forget weekly, semi-monthly or monthly lubrication and inspection when Acme Visible is on guard. Maintenance, repair and parts records for each machine are a unit. Therefore all pertinent facts are together. And each unit carries colored signals that flag your eye when it's time to act. Result, far less down time. More production. Send for facts.

ACME VISIBLE

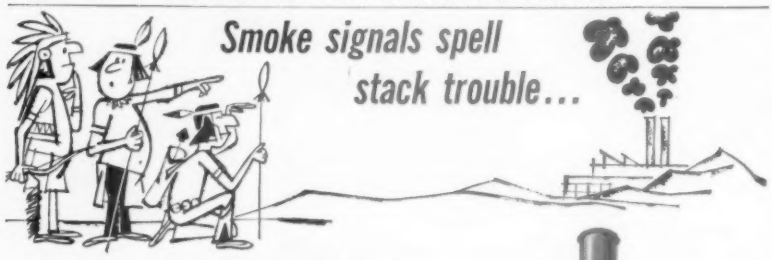
World's Largest Exclusive Makers of Visible Record Systems
ACME VISIBLE RECORDS, Inc.
3101 West Allview Drive, Crozet, Va.
Please send free literature on Acme Visible mistake-proof Preventive Maintenance Systems.
Name_____Title_____
Company_____
Address_____City_____State_____

NO MORE MAINTENANCE MISSES!

ACME VISIBLE PREVENTIVE MAINTENANCE SYSTEMS SIGNAL EVERY PERIODIC NEED FOR ATTENTION.



For more facts Circle 492 on Reader Service Card

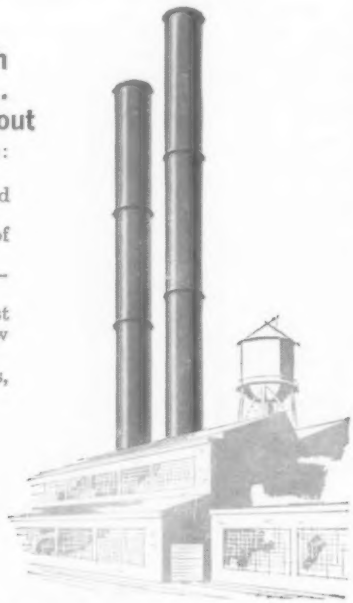


unless you're equipped with
A. O. Smith smokestacks . . .
glass-protected inside and out

Glass-protected smokestacks give you:

- A selection of colors
- 3 to 5 times longer life than unlined steel stacks
- Corrosion resistance regardless of excess acid condensate
- Low maintenance, no painting — glass can't rust
- Light weight—lower foundation cost
- Lower cost — glass protection now within reach of all

For bulletin containing all the facts, write Dept. CE-40.



Through research ...a better way
A.O.Smith
CORPORATION
SMOKESTACK SALES
PROCESS EQUIPMENT DIVISION
P. O. BOX 584 • MILWAUKEE 1, WISCONSIN

For more facts Circle 493 on Reader Service Card

CONFERENCE PROGRAM

Begins on page 174

Carter, maintenance engineer, Eli Lilly & Co., Indianapolis. Speaker: J. E. Backman, supt., Construction and Maintenance Dept., Gulf Research & Development Co. Pittsburgh.

30. Incentives and Work Measurement in Plant Maintenance—Chairman: William C. Wallin, chief, Plant Engineering Dept., Western Electric Co., Winston-Salem, N. C. Speakers: A. H. Fitzgerald, superintendent of maintenance, Draper Corp., Hopedale, Mass., and Frank O. Pierson, consultant, Industrial Engineering, Central Engineering Dept., Celanese Corp. of America, Charlotte, N. C.

31. Plant Engineering Responsibility in Plant Start-Up—Chairman: L. E. Clover, consultant, Plant Engineering and Maintenance, General Electric Co., Schenectady, N. Y. Speaker: Jesse C. Jessen, consultant, Engineering Services Div., E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

(Sessions 32 through 34 are Round Tables)

32. Maintenance in Food Processing Plants—Discussion Leader: Harold M. Wies, manager, Oregon Central Shop, The Quaker Oats Co., Oregon, Ill.

33. Maintenance in Research and Development Plants—Discussion Leader: George W. Lees, Jr., plant engineer, Bell Telephone Laboratories, Inc., Murray Hill, N. J.

34. Maintenance in Steel Mills—Discussion Leader: Robert C. Foster, manager of maintenance and construction, Allegheny Ludlum Steel Corp., Brackenridge, Pa.

Maintenance ideas

Want dollar-saving help with plant problems? These reprints can supply it. Write Reader Service Department, FACTORY, 330 West 42nd St., New York 36.

35¢ each

21 Mechanized Maintenance Control
22 Management of Maintenance
139 What Planned Maintenance Means
183 Maintenance to Fit Any Plant
217 Work Sampling in Maintenance
233 Critical Path Scheduling

50¢ each

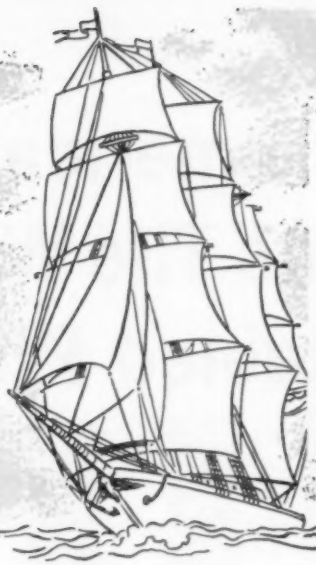
187 What Industry is Spending for Maintenance
211 Organizing for Better Maintenance
220 Maintenance Training

75¢ each

30 Maintenance Work Measurement
31 Best in Plant Maintenance
106 Preventive Maintenance
163 Maintenance Management Practices
180 Better Maintenance Stores

Why Rust-Oleum is different—

and what this difference, backed by 35 years of industry proof, means to you!



A Sea Captain developed it . . . Industry proved it!

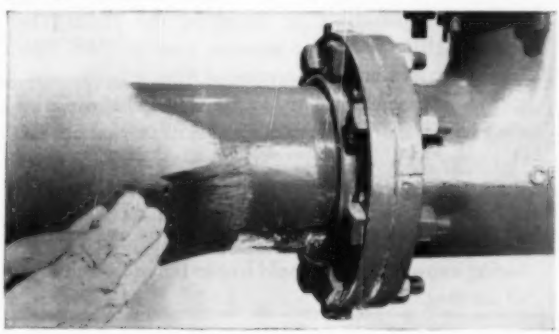
The original Rust-Oleum formula was developed nearly fifty years ago by Sea Captain Robert Fergusson, who became intrigued with the rust-stopping qualities of fish oil early in his career. Creating a *special treatment* for the fish oil, he used the *specially-processed fish oil* as the vehicle in combination with fine rust-inhibiting pigments. The result? A coating that actually *stopped rust* when applied directly over sound rusted surfaces, after scraping and wirebrushing to remove rust scale and loose rust. Possible, because the *specially-processed* fish oil penetrated the rust to bare metal. This was the birth of Rust-Oleum's *exclusive* 769 Damp-Proof Red Primer.

PROVED THROUGHOUT INDUSTRY FOR OVER 35 YEARS

Today, Rust-Oleum in its many systems and colors, has been proved throughout industry for over thirty-five years. This proof by leading industrial users is your assurance of savings in time, money, and metal. Economies made possible by the fact that Rust-Oleum 769 Damp-Proof Red Primer goes right over the sound rusted metal—usually eliminating costly surface preparations. And Rust-Oleum, in its various systems, resists rain, sun, fumes, heat, weathering, chemicals, etc., for lasting beauty over the years.

RUST-OLEUM NEW COLOR HORIZONS SYSTEM

The Rust-Oleum New Color Horizons System introduces a new coating concept to industry. It combines four important factors: (1) the ability to stop rust, (2) smart, modern color harmony, (3) the durability to last and last, (4) ease of application that saves time, money, and metal. See how this system can bring lasting beauty to your plant, machinery, equipment, pipes, tanks, structural steel, fences, etc. Write for complete information or contact your nearby Rust-Oleum Industrial Distributor. He maintains complete stocks for prompt service.



RUST-OLEUM®

There are imitations, but only *one* Rust-Oleum. It is distinctive as your own fingerprint.

STOPS RUST!®

ATTACH TO YOUR LETTERHEAD

Rust-Oleum Corporation
2482 Oakton St., Evanston, Illinois

Please send me the following at no cost or obligation:

- ☐ New Color Horizons Systems Catalog featuring 110 actual color standards and 69 photo applications.
- ☐ Free test sample of Rust-Oleum 769 Damp-Proof Red Primer to be applied over sound rusted surface.
- ☐ Results of radioactive tracing study on Rust-Oleum fish oil penetration.

How American Industry Points The Way To Sustained Prosperity in 1961

Something new and very constructive is happening in American industry. It promises to add a major element of strength to business not only in 1961 but right along over the years ahead.

What is happening is essentially this. **American industry is planning to continue to invest heavily in new and better producing facilities in spite of the fact that it has an excess of capacity to produce its present range of products. And, by doing so, business is helping to shape a stronger American economy.** For the continuation of a high level of capital investment by business is one of the most important keys to sustained prosperity.

News of this major new development in American industry is provided by the results of the McGraw-Hill Fall Survey of Business Investment Plans for 1961 and 1962, presented in detail at the right. The McGraw-Hill investment surveys, now in their 13th year, cover a broad cross-section of American industry.

How American industry is aiming to go ahead with a big investment program in spite of its present burden of excess producing capacity is highlighted by the plans of manufacturing companies. The McGraw-Hill fall survey finds that, on the average, these companies are using slightly less than 80 per cent of their producing capacity. They would like to be using well over 90 per cent.

Dramatic New Departure

If historic investment patterns were being followed, our manufacturing companies, with only about 80 per cent of their capacity being employed, would be cutting back new investment programs drastically, and cutting down prosperity in the process. **But — and here is the dramatic new fact — they plan almost no cut-backs in their investment programs.** They plan to invest almost as much (within 3%) in 1961 as they are investing this year. And this year they are investing 19 per cent more than they did in 1959.

There are two major reasons why American industry is unwilling to let its excess producing capacity stall its investment in new facilities until the capacity is more fully used. One is that a lot of this capacity is obsolete and costly to operate. Increasingly rugged competition is creating a strong inducement to replace this antique capacity with modern, more efficient equipment which is widely available.

PLANS FOR CAPITAL SPENDING
(Billions of Dollars)

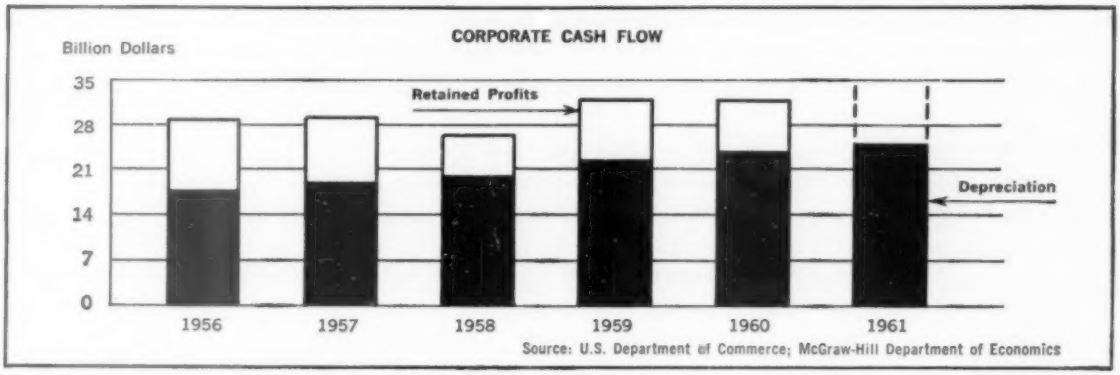
INDUSTRY	1959 Actual*	1960 Estimated*	1961 Planned	1960-1961 % Change	1962 Planned
Iron and Steel	$1.04	$1.52	$1.37	−10%	$1.18
Nonferrous Metals	.31	.34	.34	0	.32
Machinery	.91	1.15	1.11	− 3	1.11
Electrical Machinery	.52	.62	.68	+10	.63
Autos, Trucks & Parts	.64	.89	.95	+ 7	1.02
Transportation Equipment (Aircraft, Ships, R.R. Eq'pt.)	.39	.41	.37	−10	.35
Other Metalworking	.88	.97	.85	−12	.87
Chemicals	1.24	1.61	1.64	+ 2	1.59
Paper and Pulp	.63	.75	.69	− 8	.53
Rubber	.19	.24	.23	− 4	.20
Stone, Clay and Glass	.53	.63	.56	−11	.55
Petroleum & Coal Products	2.49	2.45	2.52	+ 3	2.50
Food and Beverages	.82	.94	.99	+ 5	.97
Textiles	.41	.53	.42	−21	.40
Miscellaneous Manufacturing	1.07	1.28	1.21	− 5	1.13
ALL MANUFACTURING	12.07	14.33	13.93	− 3	13.35
Mining	.99	.99	.90	− 9	.89
Railroads	.92	1.04	.79	−24	.83
Other Transportation & Communications	4.69	5.20	4.61	−11	4.18
Electric And Gas Utilities	5.67	5.89	6.14	+ 4	6.01
Commercial (1)	8.21	8.61	8.70	+ 1	8.54
ALL BUSINESS	32.55	36.06	35.07	− 3	33.80

*U.S. Department of Commerce, Securities and Exchange Commission, McGraw-Hill Department of Economics.

(1) Figure based on large chain, mail order and department stores, insurance companies, banks and other commercial businesses.

"R And D" Paves The Way

The steel industry provides a good case in point. Despite an operating rate of little more than 50 per cent during the last six months, steel companies plan a total investment of nearly $1.4 billion in 1961. And though this is 10 per cent below their capital expenditures in 1960, it will still be the third highest year on record.



Also, new investment is required to tool up for the manufacture of the new products being spawned by the continuing boom in industrial research and development. This year, we are spending about $13 billion (that's *billion*) for all research and development, about $9.6 billion of it through industry.* And out of it is coming the "know-how" for a veritable flood of new products, processes and equipment, most all of these calling for new producing equipment. Next year, American manufacturers plan to get 12 per cent of their sales in products that did not even exist four years ago.

Key Role Of Depreciation Reserves

A major reason why American industry can combine the desire to carry out big new investment programs with the necessary financial capacity to do it is to be found in the growth of its reserves for depreciation. This year, (1960), business has been in a squeeze between costs and the prices it could get for its products. This cost-price squeeze has reduced profits sharply. The total of profits for the year will be down about 5 per cent.

Allowances for the depreciation of existing plant and equipment, however, have continued to rise. The result is that the so-called cash flow of corporations (their retained profits plus their allowances for depreciation) is the same this year as last. And this cash flow, shown in the chart above, makes a decisive contribution to financing new investment.

Inflation Would Be Deadly

If the sort of profit squeeze that has prevailed this year were to become chronic, it would blight both the incentive and wherewithal to continue a vigorous program of new investment. In addition, if price inflation were to begin surging again, it would eat away the power of depreciation reserves to purchase new plant and equipment.

The allowances now permitted American industrial firms for the depreciation of their producing facilities are lower than those made in any of the industrial countries with which we are in increasingly tough competition. More adequate allowances would speed up the job of modernizing American industry. An earlier McGraw-Hill survey indicated that it would cost only slightly less than $100 billion to bring our nation's plant and equipment up to date.

But at this juncture, American industry's eagerness and capacity to maintain a high level of investment capital is adding a great new element of constructive strength to the nation's economy.

---

*The significance of this boom for American industry is analyzed in a new McGraw-Hill book, "The Research Revolution" by Leonard Silk, Economics Editor of BUSINESS WEEK. Together with other new business investment trends the "R & D" boom also constitutes a key part of another new McGraw-Hill book, "New Forces in American Business" by Dexter M. Keezer and associates — the November selection of the Business Book Club.

This message was prepared by my staff associates as part of our company-wide effort to report on major new developments in American business and industry. Permission is freely extended to newspapers, groups or individuals to quote or reprint all or part of the text.

Donald C. McGraw

PRESIDENT

McGRAW-HILL PUBLISHING COMPANY

FACTORY

IDEAS OF THE MONTH

By LEWIS K. URQUHART, Consulting Editor, FACTORY

(For more information, circle item numbers on Reader Service Card next to back cover)

For palletless handling of unit loads, particularly bulky but relatively light loads shipped in cartons, there's a new fork truck attachment called Carton-Pac *(Clark)*. Loads are supported by corrugated sheet scored to fit around bottom and overhang on two special forks. **(236)**

Beats raw beefsteak. New cold pack *(Kwik-Kold)* provides fast first aid for sprains, bruises, contusions. Hits 20 F. 2 sec. after squeezing. Stays cold 30 min., long enough to minimize swelling, pain, discoloration. **(237)**

Common-sense approach to a sharp reduction in plant lighting costs is through a 4-part plan *(Westinghouse)* that's based on an area-by-area analysis of existing lighting installations. **(238)**

New guide to industry statistics *(BLS)* lists all series of employment and/or hours and earnings data compiled 1939-58 by industry and by area. 90 pages. Single copies free (as long as supply lasts). **(239)**

Watchman control unit *(Tele-Norm)* turns private plant telephone lines into plant protection system. Watchman dials code number on designated phones; intercom switchboard registers time and location of calls; check-in point numbers are lighted on panel. If watchman fails to check in within pre-set time, plant siren sounds off. Code numbers are pre-arranged daily. **(240)**

Next time it snows be ready with a snow pusher, preferably SnoJet *(Union Steel Products)*, a sure-enough jim-dandy with tricycle, non-skid running gear, and highway-type blade which throws snow in two directions. Clears 28-in. path in one sweep. Walks right through 6 to 8 inches of white stuff. **(241)**

Temperature conversion chart *(Rosemount)* converts from any scale (K, R, F, C) to any other. From absolute zero to 16,000 C. **(242)**

For less than $10 you can now buy machine mounts *(Felters)* that simplify installation and leveling of equipment weighing up to 1½ tons. No bolting or lagging to floor. Pads in mounts dampen both sound and vibration. **(243)**

Shipping door heater works two ways: When door opens, Vari-Jet *(Wing)* provides high-velocity curtain of warm air to temper inrushing blast. When it closes, damper is automatically repositioned, heater discharges warm air at normal velocity to provide room or perimeter heating. **(244)**

Disc Calculator *(H-VM-M)* gives you sfpm. of buffing and polishing wheels from 1 to 60 in., at spindle speeds from 220 to 20,000 rpm. **(245)**

Turn the page

J & L NEWSLETTER—

the man who needs a new machine tool is already paying for it

NON-MACHINING CYCLE TIME CUT 70%

Completely automatic operation with push button programming for all machine motions including speed and feed change, turret indexing, fast motion, coolant, on and off, plus the potential for a great variety of tooling, make the new J & L automatic turret lathe an economic windfall. Add to this the machine's generous capacities, plus a 50% reduction in necessary operator attention. Result --- Money in the bank.
Write for GL-6029.

SPINDLE SPEEDS UP TO 15,000 RPM ON NEW GUN DRILLING MACHINE

10 to 12 gallons of coolant, at 2000 PSI are distributed through the rotating spindle of this machine. Deep holes from 1/2" dia., down to the smallest, are drilled at very high penetration rates. 12" per minute is not an unusual operation. Hole straightness is held within .0005" in 6" of length.
Write for CO-6014.

NEW LIGHT CONCENTRATORS AID OPTICAL INSPECTION

Instant visual inspections of tiny assemblies such as tunnel and mesa diodes and memory drum recording heads are now being performed with J & L Optical Comparators. Reflected images, at high magnifications, show sub-assembly elements with remarkable clarity.
Write for GL-6029.

NO DEPOSIT OR DOWN PAYMENT FOR MACHINE LEASING

"Profitivity"(R) leasing arrangements, through J & L, may even include machines made by other companies. Special tooling, fixtures and original perishable tools may be included in the initial lease. No deposit --- no down payment.
Write for HU-6002R.

WRITTEN GUARANTEE FOR THREAD CHASERS

Every set of chasers shipped from J & L carries a written guarantee to produce a Class III fit or better with repetitive accuracy over the full life of the chasers. This holds true for chasers in both radial and tangent chaser type J & L Automatic Opening Die Heads.
Write for 5701.

PERPETUAL FORM CONTROL FOR 12" OF WHEEL SPREAD

High production, precision plunge grinding of widely spaced grooves is a featured application of the J & L Model E-3 Automatic Form Grinder. Perpetual Form Control (PFC) allows multiple grooves with a spread of up to 12" to be plunge ground in a single pass. Wheel dressing can be either intermittent or simultaneous with grinding.
Write for LO-5712R.

JONES & LAMSON MACHINE COMPANY

505 Clinton Street, Springfield, Vermont, U.S.A.

For more facts Circle 505 on Reader Service Card

More than 1000 research and testing laboratories in New York State, commercial and private, are detailed in 280-page 1960 directory *(State Commerce Department)*. Also special research fields, names of executives, number of scientists and engineers employed. Yes, it's free. **(246)**

Dunking stations *(Sipco)* offer choice of six signs (e.g., "Smokers, put it out") that stress company housekeeping rules, keep cigarette butts off floors, out of corners. They're permanently mounted, have glass-fiber liners. **(247)**

Soundest idea in filing could be Conserv-a-matic *(Supreme Steel)*. Shelves suspended in tiers revolve to central service opening by electrically operated conveyor. Single 16-shelf unit, 116 in. high, 33 in. deep, has capacity of five-and-a-half 4-drawer cabinets, saves up to 75% floor space. **(248)**

Don't buy that stopwatch till you've seen decimal timer *(Heuer)* with central register. Thin black second hand makes complete revolution in 60 sec.; large red minute hand registers up to 60 min. Black outside dial reads in decimal minutes, red center dial in seconds and/or minutes. **(249)**

Booklet of the Month is "The Story of Prices" *(Du Pont)*. Shows why, despite rising price trends (Consumer Price Index up 70% since 1929), products and services represent a better buy today than ever in the past. **(250)**

Carriage bolts, anyone? Kind that won't shear off in a hurry? Sample on our desk, says maker *(Premier)*, is twice as strong as any other on market. High-carbon steel is triple heat-treated, plated to resist corrosion. **(251)**

Which gasket for corrosive service? Free chart *(U. S. Rubber)* shows chemical resistance of gasket materials, indicates degree of safety with which they may be used in couple of hundred specific services. **(252)**

Cold spots in your plant? Shivering workers? All your fault. Newest portable heater *(Master)* weighs only 35 lb., carries anywhere. Circulates enough warm air to heat 5-room house. Runs up to 14 hours on 5-gal. tank of kerosene or No. 1 fuel oil. Plugs into nearest 115-volt a-c outlet. **(253)**

Acousti-Closures are engineered units *(Industrial Acoustics)* designed to silence noisy office machines. Three types: two for table-mounted equipment, one to control noise of floor-mounted machines. **(254)**

Most powerful sabre saw on the market, says maker *(Black & Decker)*, has rock-and-lock shoe which stays flush with work regardless of angle of cut. And 3-way chuck—blade can be mounted to cut up, down, sideways. **(255)**

Don't forget that more than 100 helpful FACTORY articles are now available in reprint form at nominal cost. For complete list of titles, circle this number on Reader Service Card inside back cover: **(256)**

Turn the page

YOU CAN SAVE ON ELECTRIC TRUCK POWER THREE WAYS

Get more battery capacity per dollar per year. For years, Exide-Ironclad Battery users have consistently reported unequaled battery economy. Now the new TGS Exide-Ironclad Battery gives you another 11% more capacity with no increase in battery size. Your trucks can do still more work per shift, and you get greater economy than ever.

Use efficient chargers. Exide vertical chargers are specially designed for industrial truck service. They give you actually more charging capacity for the price. Vertical design saves two-thirds floor space, keeps out dirt for lower-cost upkeep. Oversize bearings, dual-protected by bearing seals and external dust shields, prolong charger life.

Keep your equipment functioning. Regular inspection by capable service men is a real economy measure. And no service matches Exide service—over 160 men in 47 offices coast to coast. All are factory trained—specialize in Exide industrial batteries and chargers. They help you get the maximum life and economy from your batteries.

GET THE COMPLETE EXIDE POWER PACKAGE: BATTERIES, CHARGERS, SERVICE. For additional information, write Exide Industrial Division, The Electric Storage Battery Company, Philadelphia 20, Pa.

Exide®

For more facts Circle 506 on Reader Service Card

IDEAS OF THE MONTH . . . *Begins on page 184*
(For more information, circle item numbers on Reader Service Card next to back cover)

Handling loaded drums of solvents, cutting oils, detergents, is easy and safe with combination truck-and-drain rack *(Palmer-Shile).* Detachable handles can be removed to conserve floor space. **(257)**

And Drum Caddy *(Holsclaw)* is handy-dandy steel band with "ears." Truck operator drops it over drum, tightens clamp, picks up drum on forks. **(258)**

Roof damage from ice and snow can be stopped with "no-freeze miracle roof protector" *(David Levow).* Brass canisters of de-icing solution install in seconds over drainspouts, go to work automatically in freezing weather. **(259)**

Lease shop furniture? Now you can. New plan *(Standard Pressed Steel)* is first to cover steel shelving, work benches, etc. **(260)**

Thing you'll like about anodized aluminum rules *(Fairgate)*: Numbers run left to right or right to left. Width, 1 in. Lengths, 36 to 96 in. **(261)**

To protect fragile flat-car lading from damaging impacts, try Tylastic Tie-downs *(Lord).* Seems specially designed elastomeric springs deflect as much as 20 in., absorbing up to 90% of shock force. **(262)**

Hear-Guard is newest anti-noise ear plug *(American Optical)*. White plastic. Three sizes. With tab for easy, safe insertion. Worker can still hear conversation. Can be cleaned with soap and lukewarm water. **(263)**

Alurail is—you guessed it—aluminum handrail *(Aluminum Railing Corp.)*. Contemporary design. Will accommodate any stair angle. Can be erected on site with hacksaw, drill, wrench. Bolt anchorage is concealed. No threading. No welding. Natural or colored Alumilite finish. **(264)**

Modular production assembly system *(Flotron)* comprises basic bench modules that can be combined to form 2- or 3-level work stations, plus variety of clip-on shelves, work and tool holders. **(265)**

Why build your own clean room? You'll save executive and engineering time, get assured results, by purchasing one complete from a supplier *(Controlled Environment)*. Comes in one package for one price. **(266)**

If your spray guns drip at the nozzle, you may want to take a look at Ban-Drip *(B & G)* in which Plaskon nylon has replaced metal, and newly designed shut-off cuts liquid flow instantaneously. **(267)**

MAINTENANCE COSTS DISAPPEAR WITH NEW BARCLAY PLANK!

Even the best paint jobs will eventually crack, chip or flake. Barclay Plank never does! For new Barclay Plank is processed with Melamine-Silicone "590", an exclusive, protective baked-on melamine plastic coating. Its super-smooth surface is sealed against all dust, dirt and grease. That's why once Barclay Plank is up, there's no more upkeep! Just a sturdy expanse of handsome wall paneling that stays smooth as new for years...resists stains, heat, scratches—all costly headaches — for keeps! Covers new walls, old walls, open studding...in no time flat. Needs no repainting, ever! In short, it's the most handsome, most versatile wall for all factories, production areas, cafeterias, offices, reception and rest rooms. Available in solid decorator colors and random-grooved wood grains, all a handy 16" wide and 8' high, ¼" tongue-and-groove or ⅛" butt edge. Put 'em up and start saving today! Telephone or write Barclay Mfg. Co., Inc. (an affiliate of Barclite Corp. of America) Dept. F-1-PK, Barclay Building, New York 51, N. Y.

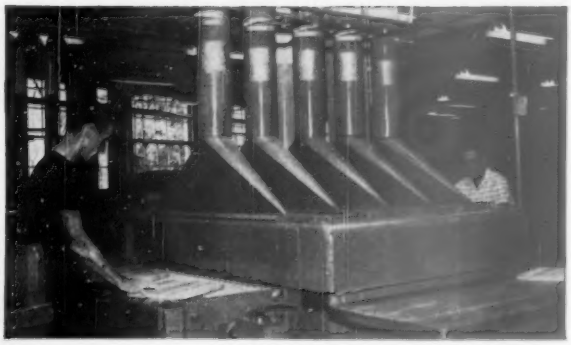
BARCLAY TONGUE & GROOVE **PLANK**

Circle 507 on Reader Service Card

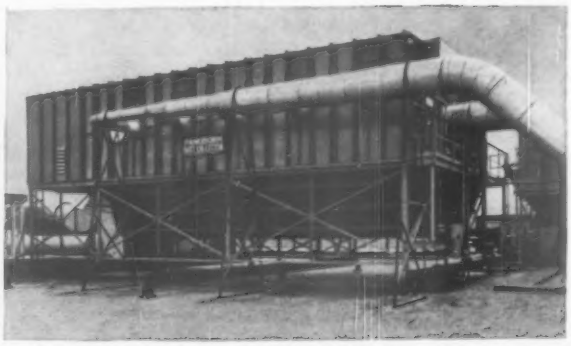
Operation: Dust Control

(One of a series)

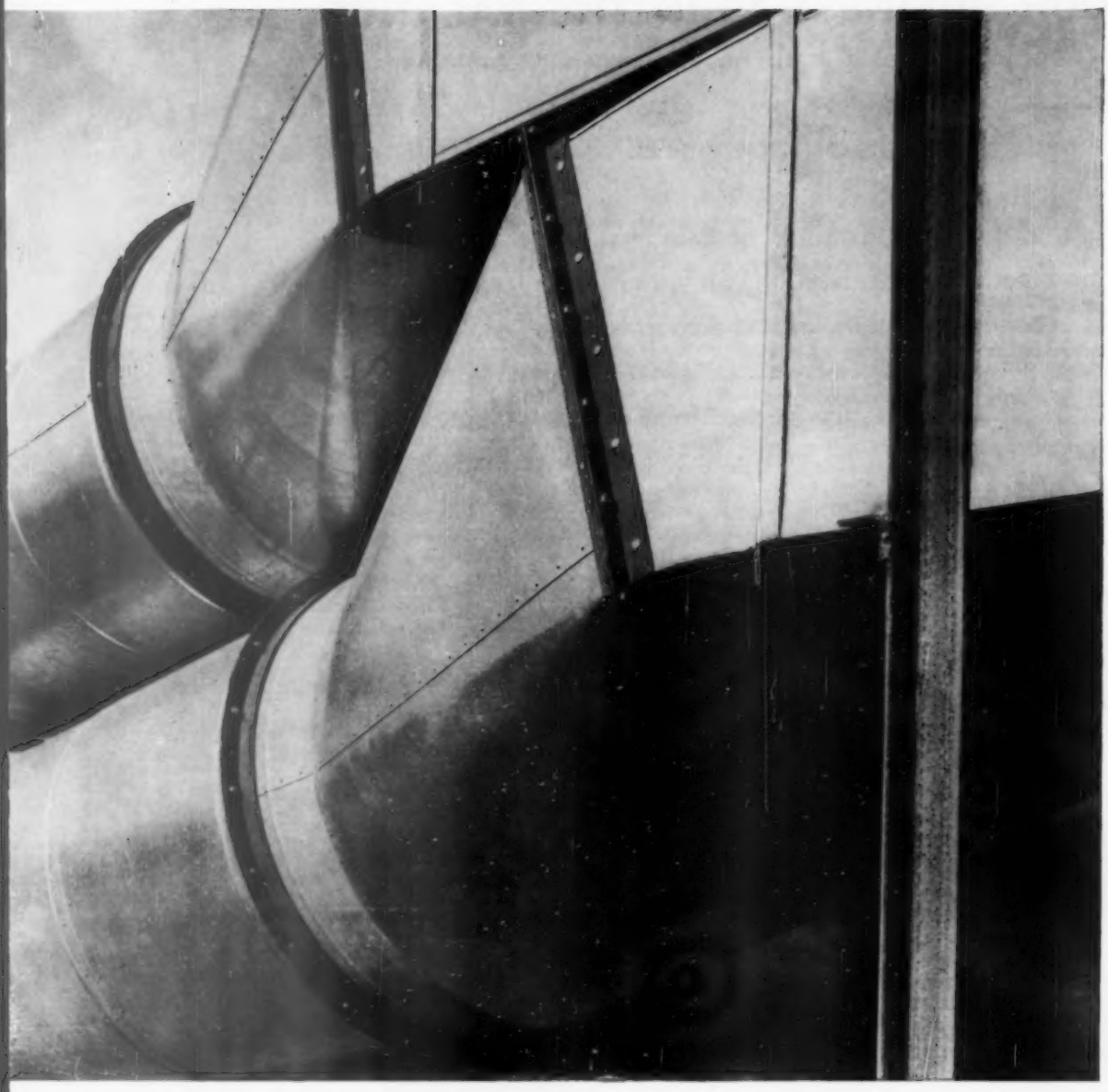
At National Cash Register, 10 tons of wood



Dust is trapped at the source by hoods engineered for the individual job . . .



. . . and is piped from 160 locations to five giant Pangborn Cloth Bag Collectors.



shavings, chips and dust are collected daily!

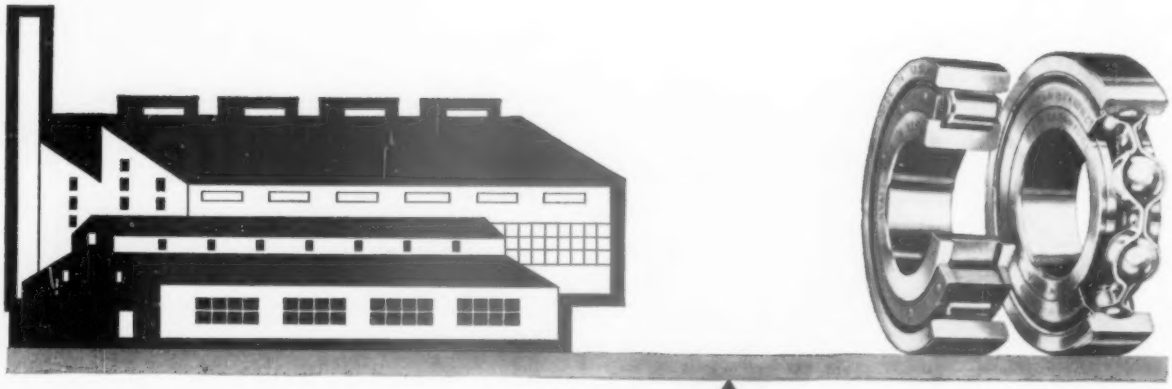
Mammoth is the word for the 5-floor woodworking plant of National Cash Register headquarters, Dayton, Ohio. Processing nearly 300,000 sq. ft. of lumber each month, this operation generates 10 tons of waste material per day.

To protect NCR employees, equipment, plant and neighborhood, five Pangborn Cloth Bag Dust Collectors trap 90 cu. ft. of fine dust for disposal and, during the winter months, permit recirculating of the already-heated, cleaned air. This efficient performance of Pangborn Dust Control saves thousands of dollars in heating costs during the cold weather. In addition, a neighborhood and health nuisance has been eliminated; equipment maintenance and plant housekeeping costs have been minimized.

Dust a continuing problem in *your* plant? Talk to the Pangborn man in your area or write: PANGBORN CORPORATION, 2100 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Dust Control, Blast Cleaning, Vibratory Equipment—Rotoblast® Steel Shot and Grit.®*

Pangborn
OF HAGERSTOWN

YOUR BUSINESS IS IN THE BALANCE . . . and bearing failures can work against you. That's why it's important to specify New Departure ball bearings and Hyatt roller bearings for the machinery in your plant. They provide significant performance reliability, the kind of worry-free, trouble-free service that helps to cut costs and keep maintenance to a minimum. Together N/D and Hyatt are the world's largest manufacturer of bearings. With nearly 30,000 original equipment customers, they supply bearings for virtually every type of industrial equipment in use today. These high quality, durable bearings are readily available to you through the national network of N/D-Hyatt Industrial Bearings Distributors . . . who are backed up by United Motors Service bearings warehouses across the country. So when you replace bearings, be sure you get the best fast. Specify New Departure and Hyatt from your Industrial Bearings Distributor.



New Departure and Hyatt bearings are supplied through . . . U-M-S

HYATT NEW DEPARTURE

By PAUL A. KING, Member, New York Bar

Sick, sick, sick employees are special cases

Psychoneurotic workers must be treated as if they were just plain sick and your prejudices must be set aside if this arbitration award means anything.

NEWS TIPS

• Taking inventory? Require overtime? Does your overtime clause read something like this? "Overtime in any job classification shall be distributed among all hourly paid employees of that classification as evenly as possible." If so, and you draft employees from other classifications, you need not distribute equally, according to one arbitrator. The work is not normally performed by employees in these classifications, he reasoned.

• A contract oversight cost one company holiday pay during an employee's sick leave. An arbitrator ruled for the payment because the company didn't have a rule against holiday pay during sick leave.

• In many contracts you'll find a clause of this sort: "This agreement is binding upon the parties, their successors, administrators, executives, and assigns." What happens to the contract when the business is sold? Does the purchaser get stuck with it? Will the clause bar an election to determine whether the union that's in can represent the employees? No, says the NLRB. To bar an election, one union learned to its surprise, the purchaser must specifically agree to assume the contract.

• There are times when you can take pictures of a picket line. Here's a recent example: NLRB's General Counsel refused to issue a complaint against a company that snapped picket-line shots, reasoning that the pictures were needed as evidence to support the company's petition for an injunction against picket-line misconduct.

Start with the premise that you operate a plant for profit, that you cannot run it without employees, then this rule of arbitration must follow: "A company producing goods or services for profit is not obligated to retain an employee who is unable to report to work and perform his job with reasonable regularity." Thus, chronic illness of a worker over a long period of time would justify his discharge—even though the employee is in no way at fault for his illness. It sounds tough, but that's the general rule and one with which Arbitrator Milton H. Schmidt was in general sympathy.

But Schmidt made an exception when a psychoneurotic employee was fired. He restored the worker to sick-leave status with all the rights offered by the employer to employees on sick leave.

There was no question that the employee was a chronic absentee over a long period of time. But, reasoned Schmidt, "I can see no great disadvantage that would have resulted to the company, except perhaps some increase in group insurance costs or some burden upon the pension fund by permitting this employee to go on a sick-leave layoff status." Philosophized Schmidt: "After all, a man's long record of good service as an employee should count for something and should stand him in good stead when illness strikes him down and he can no longer perform his work responsibilities." But the arbitrator cautioned that his conclusions were not to be considered general or to be universally applied. They applied to the facts of this particular case alone. Here are the five major points:

1. The employee had been with the company for over 13 years.
2. For two years prior to his discharge he had a bad record of chronic and excessive absenteeism.
3. For most of his long service he was a steady and reliable worker but, according to his physician, he was suffering from "psychoneurosis, anxiety-type, chronic, moderately severe." The diagnosis was poor since the symptoms were of such long standing.
4. After another 20 months of employment he would have been entitled to a disability pension.
5. The company had carried him on sick leave for two years, then discharged him. He had received over $3300 in insurance benefits.

With these facts and this ruling, where do we come out?

• Unless there is very special negative language in your union contract, you can fire a worker for chronic absenteeism—even for justifiable illness.

• If he is a long-service employee about to receive disability benefits, the arbitrator in the case may sympathize with the employee.

• If you are of the old school with little patience except for those suffering from easily labelled organic disease, get with the new thinking. Schmidt pointed out: "The medical evidence . . . established that this grievant was a sick man, suffering from an emotional disturbance which was as real and disabling as a physical ailment with more objective symptoms. Indeed, it is no longer open to doubt that a psychological illness frequently is far more distressing and painful to the sufferer than a physical illness for which medical science has developed more specific remedies."

Turn the page

"Call FOSTER... they'll ship Switch Material PLUS"

Right! L. B. Foster Company will ship switch material "*plus*" any standard rail section (new or relaying), crane rail and accessories, and track tools —everything you need, at lowest possible costs. Foster is your fastest, most dependable source for every rail and track item required for industrial sidings or in-plant trackage.

One more "*plus*": the advantage of lower freight rates from Foster's nationwide warehouses and stocking points. To help select materials best suited to your job, call the Foster Track Specialist.

Write **L. B. FOSTER CO.** for Track Catalog FA-1
Pittsburgh 30 · New York 7 · Chicago 4 · Houston 2
Los Angeles 5 · Atlanta 8 · Cleveland 35

Faster From Foster
PIPE • PILING • RAIL

For more facts Circle 511 on Reader Service Card

Begins on page 193

Superseniority

How do you handle a superseniority clause for union officers on layoff when elected?

Suppose your contract has a superseniority clause for local union officials. Suppose also that they are on layoff when elected. Are such newly elected officials entitled to walk into the plant, take a job, and bounce their employees with greater seniority?

Several months ago, one arbitrator decided that such a clause didn't give the newly elected official the right to a job at once. The best he could expect was to be put to work when an opening occurred. These clauses, the arbitrator felt, were designed to cover present officials about to be laid off.

However, another arbitrator, in a later award, didn't agree. He decided that in a case such as this, superseniority entitled the just-elected steward to a job immediately. He fell for the union's story that under the superseniority clause the electee became the oldest employee in the plant. Thus, he couldn't be kept on layoff while less senior employees were working on the production line.

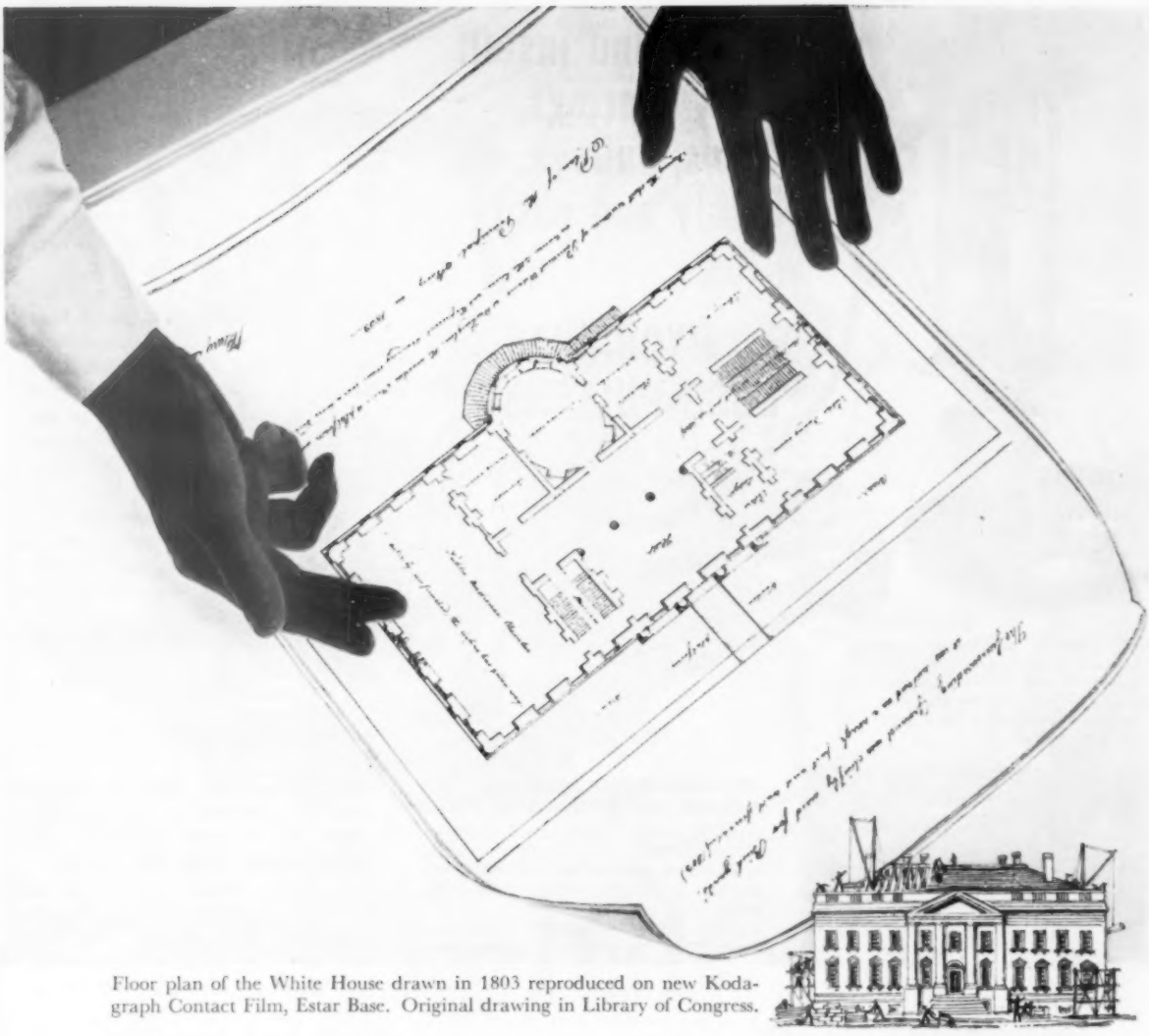
Late grievances

To the labor relations manager, the right clause at the right time is as good as the cavalry coming to the rescue in on old-time western—just as the Indians set fire to the brush around the stake.

Whoever inserted this clause in a supermarket company's union contract, did a good job:

"No grievance or claim of violation of this agreement shall be recognized unless presented in writing within ninety (90) days from the date of the occurrence causing the complaint or grievance, except in cases where report of a grievance has been suppressed through coercion by the employer."

This clause was solid enough to give the Washington Supreme Court the authority to throw out a lawsuit brought by an employee to collect back wages owing under a union



Floor plan of the White House drawn in 1803 reproduced on new Kodagraph Contact Film, Estar Base. Original drawing in Library of Congress.

New way to restore old drawings!

New Kodagraph Contact Film, Estar Base, transforms old, soiled, or weak-lined drawings into top-quality intermediates which will stand up under punishment in print-making machines and on drafting boards.

Bound to be a favorite in darkroom as well as drafting room, this new Kodagraph Contact Film lets you produce same-size intermediates with new convenience. Simply expose with low-cost paper negative (or film negative) in standard contact printer. Process with either paper or litho developer. Exceptionally wide latitude—in exposure and development—all but ends make-overs.

See this new Kodagraph Film—and the others in the new *Estar Base line:* Kodagraph AutopositiveFilm; KodagraphProjectionFilm. *All combine* reliable Kodak emulsions on the new Estar Base—highly translucent, durable, and dimensionally stable, with excellent matte surface on both sides for easy drafting. Available in standard drawing sheet sizes and in rolls up to 52 inches wide. Call your local Kodagraph Dealer, or write Eastman Kodak Company, Graphic Reproduction Division, Rochester 4, N. Y.

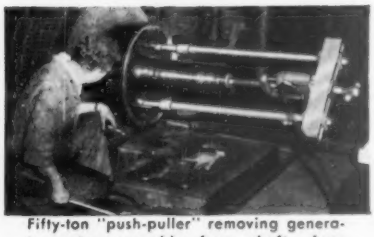
NEW!
Kodagraph
REPRODUCTION FILMS
. . . for best line-for-line reproduction

Kodak
TRADEMARK

Remove and install gears, bearings, wheels, pulleys, etc. quickly and easily with . . .

OTC HYDRAULIC "PUSH-PULLERS"

OTC hydraulic "push-puller" with attachment removes gear and bearing quickly and without damage. Push-puller (with legs threaded into a pulling attachment) is like a portable shop press.

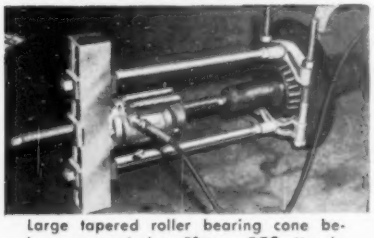


Fifty-ton "push-puller" removing generator rotor assembly from shaft. Legs extend through the assembly, connect to a pulling attachment.

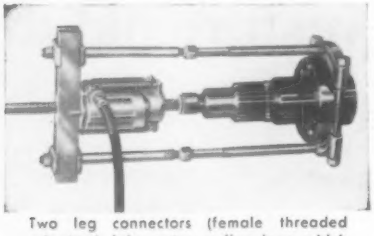
CUT MAINTENANCE COSTS AND MACHINE "DOWNTIME." SAVE PARTS!

OTC hydraulic "push-pullers" with attachments handle hundreds of tough, complicated pulling and installing jobs quickly, easily and without damage to parts.

Cut machine "downtime" and save parts by having the right tools in your shop to handle every job. Complete, versatile maintenance sets available in 17½, 30, 50 and 100-ton capacities. They pay for themselves in time saved



Large tapered roller bearing cone being removed by 50-ton OTC "push-puller" and attachment connected by threaded adapters.



Two leg connectors (female threaded adapters) join extra puller legs which thread into pulling attachment to pull a bearing.

Contact your OTC distributor for further information, or write for Industrial Maintenance Catalog. No. P-9.

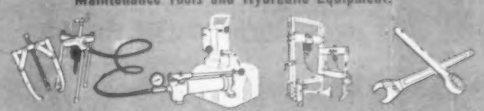
RESEARCH · ENGINEERING · DEVELOPMENT

OTC

OWATONNA TOOL COMPANY

399 CEDAR STREET OWATONNA, MINNESOTA

Designers and manufacturers of the world's most complete line of Maintenance Tools and Hydraulic Equipment.



PULLERS AND PULLER SETS · HYDRAULIC RAMS AND PUMPS · HYDRAULIC SHOP PRESSES · HAND TOOLS

Begins on page 193

contract. The employee (a grocery clerk) had been paid less than the wages called for by the contract. But he hadn't presented his grievance in writing in the prescribed time. The court, a stickler for procedure, took a dim view of it:

"A plaintiff, in order to maintain an action on a contract, must have complied with the conditions precedent contained therein. That is, a breach by a plaintiff of a material condition precedent relieves a defendant of liability under a contract. In his complaint, the appellant makes no claim of coercion, nor does he assert any excuse for noncompliance with the agreement. A requirement that grievances be submitted in writing within 90 days is not against public policy."

How's your grievance-clause cutoff provision?

Overtime

Some employees want it—others shun it. Question is, can you force employees to work overtime—discipline them when they refuse?

In many plants, employees are more than willing to work reasonable hours of overtime. That way they can pick up a few extra bucks. The problems here are overtime distribution and computation.

But you'll find a plant or two where workers will refuse to work overtime. Here, if you look closely, you'll see they have an extra axe to grind. Maybe a new contract is coming up or, as in the case involving a large salt company, the union is making a pitch to laid-off employees. This is the tie-in: no overtime until laid-off employees return to work. If overtime is consistent over a long period of time, the union may have a point. But it's a point to negotiate—not one to permit union members to refuse to work overtime. In the salt company case, the overtime wasn't even consistent. It usually occurred only to cover an emergency. But the workers refused to work overtime.

The contract between management and the union didn't say in so many words that employees could be compelled to work overtime. Nor

THE ADVENTURES OF **Tricky** THE TRACKMOBILE®

WHEREIN TRICKY DISCOVERS HOW USEFUL HE CAN BE TO YOU

There just isn't anything like a Trackmobile®. It runs on rails. It runs on the road. This duality makes it an ambidextrous vehicle of all work that can pull or push loaded rail cars and then get out from in front of them. It can plow snow; it can switch—actually it takes a book to describe all the things a Trackmobile can do. So we've published one. "Tricky the Trackmobile" is a story that will delight you and delight the kids too. Your copy is free for the asking. If you want to find out how you can drastically cut handling costs in your plant send for "Tricky the Trackmobile" today. Write: Whiting Corporation, 15689 Lathrop Avenue, Harvey, Illinois. In Canada: Whiting Corporation (Canada) Ltd., 350 Alexander Street, Welland, Ontario, Canada.

IT RUNS ON WHEELS

IT RUNS ON RAILS

Write for: "Tricky the Trackmobile"—
a full color cartoon book compliments of Whiting.

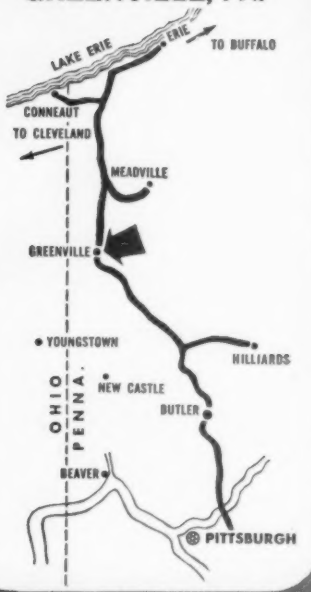
See Our Catalog in SWEETS 90 OF AMERICA'S "FIRST HUNDRED" CORPORATIONS ARE WHITING CUSTOMERS

TRACKMOBILE®

WHITING

MANUFACTURERS OF CRANES; TRAMBEAM® HANDLING SYSTEMS; PRESSUREGRIP; TRACKMOBILES®; FOUNDRY, RAILROAD, AND SWENSON CHEMICAL EQUIPMENT

LOCATE YOUR *New* PLANT
ON AN ADAPTABLE
750 ACRE SITE,
IDEALLY LOCATED AT
GREENVILLE, PA.



Here is an attractive, level, flood-free site of 750 acres that will provide the space you need for present and future production needs. It is ideally located only 80 miles from Pittsburgh and Cleveland; 150 miles from Buffalo.

This Bessemer site scores high when you consider these advantages: 24-hour delivery of steel and other basic materials; extensive deposits of coal, limestone, clay and aggregates nearby; an ample labor force of widely diversified skills; abundant supplies of power, gas and water.

Investigate today! Complete, confidential site planning and industrial engineering services are available, without obligation.

BESSEMER and LAKE ERIE RAILROAD CO.
INDUSTRIAL DEVELOPMENT DEPARTMENT
1828 FRICK BUILDING • PITTSBURGH 30, PA. • ATLANTIC 1-4780
The Bessemer Man is at your "Site Service"

Begins on page 193

did it say they couldn't be. But there were provisions about overtime distribution.

In reaching his conclusion that, under the circumstances, reasonable overtime could be required, the arbitrator cited a fellow-arbitrator who had stated:

"Where, therefore, both employment contract and collective bargaining agreement are silent on the subject of hours of employment, or fail explicitly to limit length of work day or work week beyond which no further work may be required, an employer has a right to demand overtime work, and the further right (subject to the provisions of the grievance procedure) to discipline employees for refusing to work overtime without reasonable excuse. This has been the consistent holding of the courts, the National Labor Relations Board, and many other arbitrators."

This arbitrator cited still another ruling: "Where a contract specifically refers to overtime, the parties thereby recognize the right of the company, on any reasonable occasion, to require overtime work from any employee not having a valid excuse."

In upholding the salt company's suspension of 14 employees for refusing to work overtime, the arbitrator added his own opinion to the two quoted above:

"There being no prohibition in the agreement against overtime, the company retains the right to require employees to work reasonable overtime in the absence of a valid excuse. Further, the extensive overtime provisions in the agreement impliedly recognize the right of the company to require overtime."

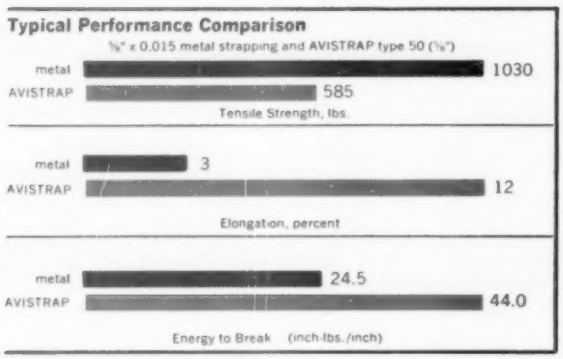
Good-faith bargaining

Two lessons here: (1) If you don't want to bargain in good faith, better hire a negotiator who can act. (2) Once a contract is negotiated for you by an association, better sign it —unless you definitely withdraw from the group before the contract is concluded.

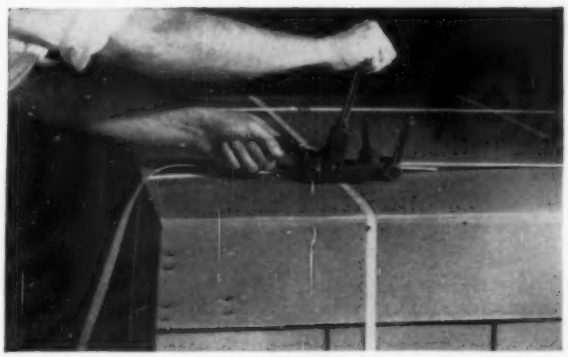
An old saying has it that you can lead a horse to water but you can't make him drink. We bet that if

NEW TOUGHNESS

It actually takes more energy to break AVISTRAP cord strapping than to break comparable-width metal strapping. Though metal has greater tensile strength, AVISTRAP—made of high-tenacity Avisco® rayon—has greater "working toughness." Strapping must either extend enough to absorb shock-energy or fail. Metal strap has far less elongation before breaking than AVISTRAP. As a result, AVISTRAP is still stretching, soaking up energy, and holding the package together after a metal strap would have stretched to its breaking point and failed.



Vital statistics. This comparison is the result of careful laboratory tests, using an Instron Tensile Testing Machine. In tests covering metal strapping from ¼" through ¾" width and from 0.012 through 0.023 thickness—AVISTRAP outperformed metal in terms of energy to break in every instance.



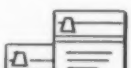
Toughness pays off here. AVISTRAP can be tightly tensioned without danger of sudden breaks, will not lash out with jagged ends. Strap breakage during handling and shipping is reduced. Other advantages: no sharp edges, light weight, easy handling, easy unpacking.

AVISTRAP* CORD STRAPPING

Economy • Local Service • Easy Handling • Reduced Damage • Safety

AVISTRAP*
CORD STRAPPING

*Trademark of American Viscose Corporation, Patents Pending.



Write for technical bulletin #4, covering AVISTRAP cord strapping strength tests. Include any other specific technical questions you may have. If you wish, arrangements can be made to demonstrate AVISTRAP cord strapping in your plant. AVISTRAP cord strapping, tools, accessories and application services are now available in all major U.S. industrial areas, through authorized local distributors. AVISTRAP district offices are listed below.

AMERICAN VISCOSE CORPORATION, INDUSTRIAL PACKAGING DEPT., 1617 PENNSYLVANIA BLVD., PHILA. 3, PA.

District offices: Atlanta, Ga., Boston, Mass., Charlotte, N.C., Chicago, Ill., Columbus, Ohio, Dallas, Tex., Denver, Colo., Los Angeles, Calif., New Orleans, La., New York, N.Y.

MEET MR. HAND-SAVER

NEW Snap-on OPEN-END WRENCH with comfort-grip handle

Give your hands a break. Get these SNAP-ON open-end wrenches with new, extra-comfortable, smoothly rounded handles that let you put on the pressure. Check all the features that make SNAP-ON the most preferred wrenches in the business . . . the lowest cost wrenches in the long run. Then order a set from your SNAP-ON representative.

Sure Fit — SNAP-ON open-end wrenches are coined and broached to close tolerances. Jaws fit snugly without slipping.

Convenient — Head and opening set at 15° angle to handle. In close quarters, tool can be turned over and a new grip taken to speed work.

Load-proportioned Handle — Wrenches are engineered so that handle length is proportioned to load wrench in handling. And SNAP-ON adds a big safety margin for extra protection.

Multi-use — Two-size opening on each wrench.

Knuckle-saving Strength — Wrenches are hammer-forged from finest steel and heat-treated to exact standards. Jaws resist spreading and dangerous slippage.

Balanced Design — Size, weight and length are correlated to give you the "feel right" balance that's a trademark of SNAP-ON wrenches.

Close-quarter Jaws — A SNAP-ON open-end has narrow, tapering, pear-shaped jaws that can reach nuts that are tucked into tight quarters.

Lightweight — Tremendous strength of steels permits SNAP-ON to make a powerful yet lightweight wrench that means greater comfort and less fatigue to user.

Wide Size Range — Sizes from ¼ in. to 1⅝ in.

FOR ALL INDUSTRY

SNAP-ON TOOLS

8044-A 28th AVENUE • KENOSHA, WISCONSIN

Begins on page 193

horses were subject to labor laws, the NLRB would find a way to make them drink. The NLRA requires employers—and unions—to go to the bargaining table. And when they get there they must do some real bargaining—in good faith.

As a check on this, the NLRB is believed to have mind-reading powers and has been given the right to examine your intent. If not satisfied with your efforts to "bargain in good faith," it can order you to change your tactics.

However, the negotiator for a California dress manufacturer made it easy for the Board when she frankly disclosed that she had come to the bargaining table to say no to what the union wanted—and to give the union a chance to say no to her demands. Maybe such candor was inappropriate. The Board ordered her to go to the bargaining table with a sincere intention of reaching an agreement.

As part of the NLRA's good-faith kick, it says that once you reach agreement with the union, you'd better sign. One company turned over its bargaining problems to an employer association. The association was to handle all its negotiations. Later, the company refused to sign the agreement reached by the association. A U.S. Circuit Court of Appeals ruled that the company had not withdrawn from the association (as it thought it had) before an agreement was reached with the union on a new contract. To avoid its contract, a company would have to break away unequivocably before the contract was concluded.

A statement by the company, when the bargaining session was breaking up, that it wouldn't go along with a profit-sharing clause, was not sufficient, declared the court. A written statement of withdrawal is the surer practice. Sign the contract, ordered the court.

THEY'RE SAYING . . .

Employees should be allowed to take up their grievances with any level of management. Gregory Smith, president of the Eastman Gelatine Corporation, told an American Man-

For more facts Circle 517 on Reader Service Card

Easily-installed PPG Neoprene-coated Duct Liner now meets fire requirements, provides extra margin of safety on ductwork installations.

NOW—PPG Fiber Glass Duct Liner Carries the UL Label

PPG Neoprene-Coated Superfine Duct Liner Meets All Requirements of NBFU Bulletins No. 90-A and 90-B for Ducts

YOUR ASSURANCE OF SAFETY

PPG is proud to announce that its Neoprene-coated Superfine Fiber Glass Duct Liner has been thoroughly tested according to the condition determined by National Board of Fire Underwriters, and has met the Board's rigid safety requirements in compliance with Bulletins No. 90-A and 90-B for ducts. It now bears the label of the Underwriter's Laboratories, Inc.

For you, this means that PPG Neoprene-coated Fiber Glass Duct Liner meets fire requirements and provides that extra margin of safety on any ductwork installation.

PLUS ALL THOSE EXTRA PPG ADVANTAGES...

. . . such as lightweight, easy handling, easy cutting and piecing, low wastage, fast installation, fine acoustical qualities, good thermal barrier characteristics, low resistance to air flow, no air erosion; and lifetime service, because it won't rot or decay, is not affected by humidity or dryness.

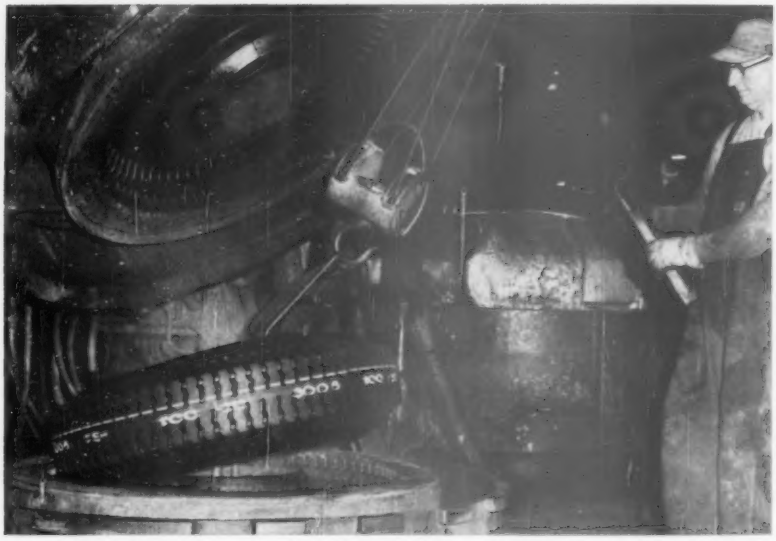
Give PPG Fiber Glass Duct Liner a try. It offers you a combination of top-flight insulation and economy. For full information, call your nearest PPG Fiber Glass Sales Office, or write *Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Pennsylvania.*

Sales Offices: Atlanta, Attleboro, Buffalo, Charlotte, Chicago, Cincinnati, Cleveland, Dallas, Denver, Detroit, Fort Wayne, Houston, Kansas City, Louisville, Los Angeles, Milwaukee, Minneapolis, New Orleans, New York, Philadelphia, Pittsburgh, San Francisco, St. Louis and Washington.

FIBER PPG GLASS PITTSBURGH PLATE GLASS COMPANY

For more facts Circle 518 on Reader Service Card

PANNIER MASTER MARKING SURVIVES WATER, HEAT, PRESSURE IN FIRESTONE TIRE MANUFACTURE



(top) A cured tire being pulled from a tire mold at Firestone Tire & Rubber Co., Akron. The Pannier code markings are still clear after having undergone water washing, and the heat and pressure of molding.

(right) The Pannier Code Printer rolls continuously on the moving tread extrusion, providing clear, unsmudged marking of tire size, stock code, shift and date. Code printer characters are quickly and easily changed. A wide range of type size is available; special characters or trade marks can be obtained.

(right) Pannier marking is immune to the effects of the dash of cooling water that pours over the hot extrusion. Pannier marking inks are scientifically formulated for each specific use and physical factor.

Whatever the industry, whatever the marking requirement – printing, stamping, embossing, stenciling, branding, Pannier has the techniques and proven equipment to do the job. Pannier engineers will be glad to consult with you without obligation.

PANNIER MASTER MARKERS

161 Pannier Bldg., Pittsburgh 12, Pa.

For more facts Circle 519 on Reader Service Card

Begins on page 193

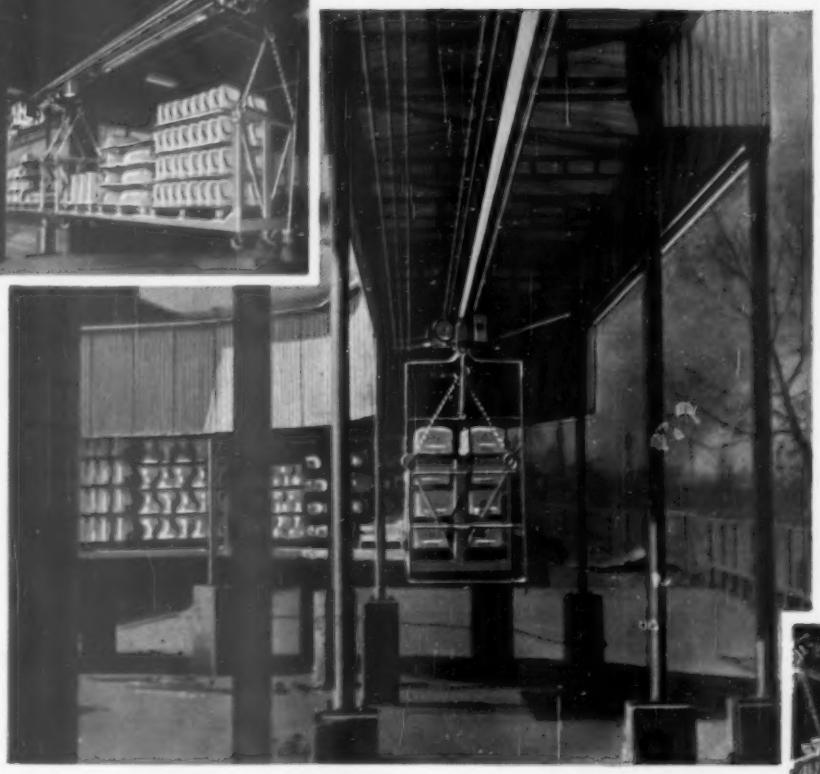
agement Association conference that he felt employees could go around the foreman's end with their grievances. But what about foreman resentment? You could tell him frankly that end play is company policy—but that no decision will be made by top management until the foreman's side has also been heard.

Arbitration clauses should state that an issue, to be arbitrable, must involve a specific provision of the agreement. Francis A. O'Connell, Jr., labor counsel for Olin Mathieson Chemical Corporation, feels this would avoid arbitration of doubtful questions that eager-beaver arbitrators are apt to consider within their domain. He also suggests that questions of arbitrability be reserved for the court—unless the parties waive a court proceeding and agree to let it go before an arbitrator.

Management rights clauses are contained in 74% of union contracts surveyed by the Bureau of National Affairs—an increase of 25% since 1957. Most clauses cover the right to direct the working force (61%); conduct the business (58%); contract methods of production (38%); close the plant, relocate, or build new facilities (20%); have rules (27%); make technological changes (16%). The report, which appeared in BNA's *Labor Relations Reporter*, also surveys restrictions on management rights, bans on union prerogatives and activities.

Automation will make traditional bargaining concepts obsolete, according to Joseph F. Finnegan, director of the Federal Mediation and Conciliation Service. He advised a conference of the Associated Industries of New York that with automation, incentive systems fought for so vigorously by management may be looked upon less lovingly. And craft and departmental seniority may be made obsolete by new department combinations.

(Selected items in this Labor Relations News section are developed from full citations published by the Bureau of National Affairs, Inc., Washington, D.C.)



UPPER LEFT . . . Loaded train moves through doors that have automatically opened, and commences trip over 1400 feet of Monorail track.

Louden Monorail Interplant Transport System operates trouble free the year around. Three carriers make up train that travels completely unattended from storage area in one building to shipping area in another. Smooth operation of Monorail insures safe transportation of chinaware between plants.

LOWER RIGHT . . . Forklift trucks quickly unload train after it automatically stops at its destination. Carriers may be lowered and raised independently for greater handling ease.

CUT COSTS WITH MONORAIL INTERPLANT TRANSPORT

Companies grow, production facilities expand and interplant handling of materials, parts, semi-finished and finished products become complicated and costly. Time and again a Louden Monorail Interplant Transport System has proved to be the perfect answer. And with Louden's Selectomatic Control, transport is automatic.

A good example is The Louden Selectomatic Interplant Transport System at the Eljer Company, Division of The Murray Corporation, Ford City, Pennsylvania. Recently, to increase plant production, another plant was built similar to the original plant. Shipping and docking facilities for both plants were retained in the original building, only the storage area was incorporated in the second. Therefore, it became necessary to get stock from the second plant to the shipping dock in the first plant. 1400 feet of Louden Monorail with three steel carriers provide the perfect answer. The Louden MotoVeyor pulls or pushes the carriers, opens and shuts doors and automatically stops at its destination . . . transport is speedy, trouble-free—regardless of the weather or road conditions, and completely unattended.

A Louden Selectomatic Transport System can do many things not required in the Eljer Company installation. It can automatically transport materials unattended from point to point anywhere in or about your plant, and can select the shortest and most direct route, opening and closing switches to its destination. It can travel from floor to floor and building to building, open doors to let itself through and close doors behind it. It stops promptly when there is a load ahead or when it does not have the right of way, and resumes travel when the way is clear. It stops accurately at its destination and even loads and unloads its own carriers with certain classes of materials. It returns empty carriers to point of origin or places itself in storage awaiting the next call.

Louden Automatic Materials Handling is the guaranteed product of the pioneers and oldest company in the field of specialized monorail handling. Both the Louden field representatives and the factory engineers are highly trained specialists in the field of overhead materials handling. When you have materials requiring handling, lifting or transporting, call on Louden for suggestions. This will cost you nothing but may prove to be the most profitable move you have ever made.

NEW . . . **52 pages of illustrated applications . . . industry by industry. Get the latest and most complete information on planning and equipment selection for the best in modern materials handling. Write today for your copy "COST-CUTTING WITH MONORAIL AND CRANES."**

Louden

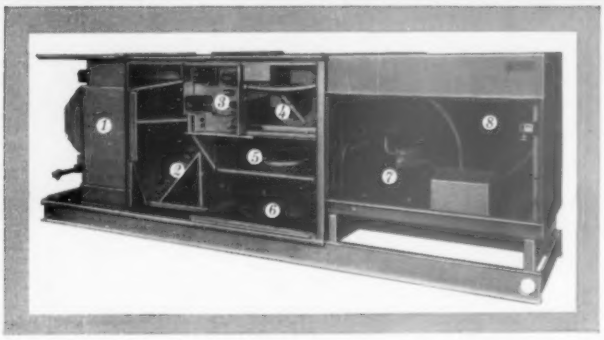
MONORAIL & CRANES

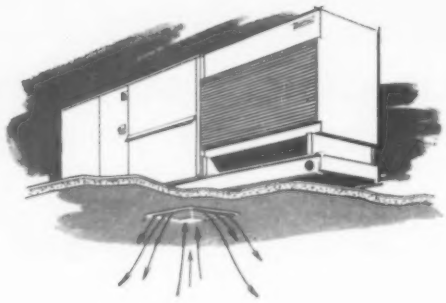
THE LOUDEN MACHINERY COMPANY

115 Broadway, Fairfield, Iowa

A subsidiary of Mechanical Handling Systems Inc.

SINCE 1867 . . . THE FIRST NAME IN MATERIALS HANDLING





SKYLINER FEATURES

1 **Armor-coated heating section**—gas-fired, two-pass, heavy-duty type, with all joints and surfaces coated, inside and out, with fire-fused A-19 corrosion resistant ceramic coating. A.G.A. approved.

2 **Cooling evaporator coil**—aluminum finned-copper tube type for peak performance. Located downstream of heating unit, adjacent to outlet.

3 **Factory-wired electrical panel**—standardized and tested to simplify installation and eliminate costly trouble-shooting.

4 **Permanently lubricated blower assembly** – heavy-duty, lube-packed, sealed ball bearings in blower and motor eliminate need for periodic lubrication service.

5 **Fresh air inlet**—provides for blending of filtered make-up air with return air. Adjustable up to ⅓ of total volume.

6 **Conditioned air outlet**—connects directly to a short, pre-insulated combination supply-return duct. There are no transmission losses.

7 **Quality Compressor**—operates up to 125°F. outside temperatures. Standard Tecumseh or Copeland, easily serviced or replaced in any section of the country.

8 **Oversize Condensing Coil**—the larger area dissipates more heat to provide greater cooling efficiency.

TECHNICAL INFORMATION SERVICE

Detailed information and product specification sheets on the Skyliner may be obtained from your local Janitrol representative or by writing the factory. There's no obligation, so why not bring your files up to date?

JANITROL®

NEW ROOF TOP HEATING-COOLING SYSTEM HAS BROAD COST & COMFORT ADVANTAGES *for single story buildings*

SKYLINER by JANITROL

DOESN'T USE INSIDE SPACE... ELIMINATES DUCT SYSTEM... ALLOWS REDUCTION IN BUILDING HEIGHT... INSTALLS *FAST* WITH LESS LABOR

Whether you should specify the Janitrol Skyliner depends on the job, of course. But if the budget is tight, and you're looking for ways to chop costs without penalizing quality, by all means consider the Skyliner.

Shipped completely factory assembled, tested and ready for installation on the roof, the Skyliner "package" provides *really* economical heating, cooling or year 'round conditioning. Conditioned air is circulated through a ceiling diffuser (located beneath the unit) in the conditioned area. No duct system is needed . . . total building height can be reduced. It has an unobtrusive, low silhouette . . . no stack is required . . . flue gas exhauster is furnished. And not a single cubic foot of usable inside space is used by the Skyliner system!

One or more Skyliner units may be used to provide a simple, efficient zone-controlled comfort system, with each Skyliner controlled by its individual thermostat. A wide range of capacities is offered to match the needs of each zone.

The Skyliner is completely enclosed in a weatherproof, insulated, aluminized steel cabinet. The unit has been operationally tested in 60 m.p.h. winds and for two hours at 12-inch/hr. rainfall. No water or sewage service, no refrigerant piping or charging and no complicated electrical wiring are required. All important factors in cutting costs and speeding up installation!

Here are Some Points to Remember about the Janitrol Skyliner

Multiple Unit Zone Control Type—You can have an individually sized and controlled unit for each occupancy area. Each unit operates only for its own zone, without standby or transmission losses. Multiple units assure continuity of service, since the shut down of a single unit for service or maintenance will not affect performance of other units.

Low Installed System Cost—A Skyliner packaged system offers substantial savings over a conventional site-fabricated central system by:

- Elimination of equipment room.
- Elimination of duct system.
- Elimination of wiring, assembly, installation and checking of individual system components.
- Elimination of water or sewage service.

Meets or exceeds national standards—All Skyliner units carry the certification seal for capacity and performance according to the rigid standards of the Air-Conditioning and Refrigeration Institute. Components are listed by Underwriters' Laboratory and the American Gas Association.

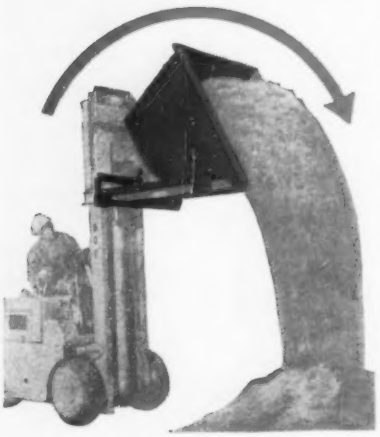
Leasing Plan to Save Capital Investment—A complete Skyliner system can be leased on a long-term basis. Permits owners to keep their working capital working.

HEATING & AIR CONDITIONING

A DIVISION OF MIDLAND-ROSS CORPORATION, COLUMBUS 16, OHIO
IN CANADA: MOFFATS LTD., TORONTO 15

A DIVISION OF M-R MIDLAND-ROSS CORP.

FITS ANY LIFT TRUCK
DUMPS
AUTOMATICALLY



CAN CUT HANDLING COSTS 50%

With this self-dumping hopper on your lift truck, one man can do the work of two—in a fraction of the usual time. It's the modern, low-cost way to handle scrap metal, small castings, cinders, punch press parts, hot forgings, cullet—all kinds of bulk material.

DUMPS ITSELF

Attaches in seconds to any lift truck—fork or platform. Can't slip off. Operator picks up loaded Hopper—transports it to its destination—releases the latch—and the Hopper automatically dumps its load, rights itself, locks itself.

RIGHTS ITSELF

LOCKS ITSELF

Roura Hoppers are sturdily made of 3/16" steel plate with continuous arc-welded seams. Heavier plate if desired, also stainless steel or galvanized. Made in eight sizes, 1/3 to 4 yard capacities, mounted on live skids or a choice of wheels. Standard models available for immediate shipment.

ROURA
Self-Dumping
HOPPER

WANT MORE DETAILS? Just clip this coupon to your letterhead and mail to
ROURA IRON WORKS, INC.
1423 Woodland Ave., Detroit 11, Michigan

Circle 522 on Reader Service Card

FACTORY BOOKS

Here's help on production

Don't let the first chapter mislead you. This book is about production control—even though on the second page the authors say it isn't confined to manufacturing activities.

And don't let the textbookish appearance of *Principles and Design of Production Control Systems* fool you. Once past the first chapter you will be embarked upon a keen, analytical examination of the principles of good planning and control. The authors have outlined these fundamentals so well that you can apply them to almost any activity in the plant—production, maintenance, warehousing, or in general office activities.

Covering a large area, the book carefully blocks out each aspect of planning and control: basic design of systems, forecasting techniques, process planning, material and tool control, loading, and so on. All are thoroughly examined and related to each other. The complete scope of the book's coverage is indicated by separate (but short) chapters on work measurement, progress reporting systems, and procedure analysis. There's even a chapter on the application of data processing and work sampling.

One of the best things about this volume is the way it covers many subjects in a short space.

As a book devoted to "developing the knowledge necessary to design and improve systems for production control," this hits the target. It keeps coming back to the three basic phases of a good system: planning, action, and follow up.

The authors have wisely avoided any drumbeating for the proper recognition of the production control function until the principles are well established. The last two chapters take a look at the place of production control and the design of its organization.

Summing up: a good distillation of many ideas about planning and controlling manufacturing operations. It's of greater value, perhaps, to one already experienced in industry than to a new student. In a concise, complete presentation it offers a good over-all review of the best principles of planning and controlling plant operations. (Reviewed by W. A. Bussard)

Principles and Design of Production Control Systems, by Evan D. Scheele, William L. Westerman, and Robert J. Wimmert. Prentice-Hall, Inc., Englewood Cliffs, N. J. 370 pages. $9.

Electrical handbook

What's the difference between a raceway and a wireway? Between watertight and weatherproof equipment? Does your power of communication wiring violate code rulings?

These questions and countless others are answered in this 10th edition of the well-known National Electrical Code Handbook. It reprints every paragraph of the 1959 Code (with its many changes and new numbering system). Each part of the Code that is not self-explanatory is followed by the author's comments, diagrams, and photos to clarify the meaning. The book includes tables, sample calculations, and a cross-index to the 1956 edition. Sponsored by the National Fire Protection Association. (Reviewed by Gerald C. Quinn)

National Electrical Code Handbook. McGraw-Hill Book Co., Inc., 330 West 42nd St., New York 36. 680 pages. $10.

* * *

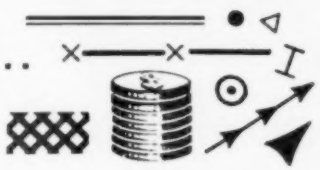
Air Pollution Manual is the first of two volumes. It covers the subject of what an air pollution problem is; legal, public relations, and health aspects; effects on plant and animal life; and economic factors involved. Then it goes on to tell of ways to detect air pollution, sampling methods for amount, methods of chemical analyses. It discusses odor problems, radioactivity, and offers solutions to both. And, of course, no discourse is complete without a discussion of

DRAWING BOARD NEWS.....No. 2

Published by Chart-Pak, Inc., originator of the tape method of drafting

CHART-PAK TAPES AND SHEETS TAKE THE DRUDGERY OUT OF DRAFTING

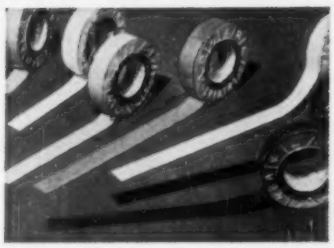
You "tape on" lines, bars, shapes, symbols . . . save hours of tedious pencil and pen work



With Chart-Pak, you no longer have to draw and ink-in many of the lines, curves, bars, shapes, patterns and symbols in a drawing. You *tape* them on!

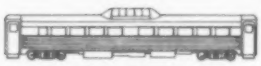
Chart-Pak supplies these elements pre-printed on pressure-sensitive tapes and sheets, ready for you to press down.

You save time and trouble in the preparation of drawings, charts, graphs and other visual presentations with Chart-Pak. And you get topnotch results because Chart-Pak materials are engineered for crisp, clean reproduction.



Now...Tapes That "Don't Talk Back" To Cameras

Chart-Pak's new "matte-surface" acetate fibre tapes are completely glare-proof. They eliminate the bothersome highlights that cameras pick up from glossier tapes. They're also thin, to eliminate shadows — won't shrink, yellow or peel.

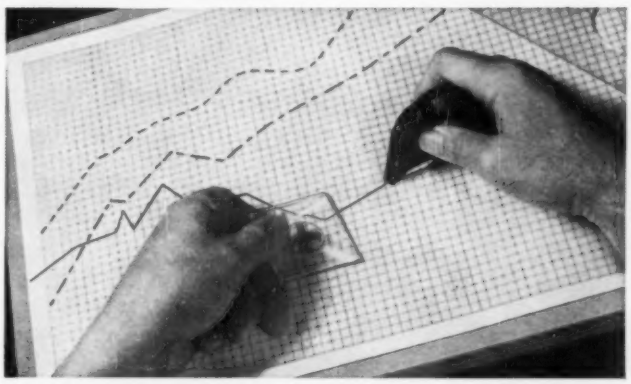


Budd Company "Earlybird" user of Chart-Pak

This famous company uses Chart-Pak constantly, in charts and graphs that keep a running record of costs and operation. Factors from direct labor costs to demurrage are plotted, with Chart-Pak tapes, in four Budd plants.

In wide use everywhere . . .

Chart-Pak's customer list reads like a "Who's Who of U.S. Industry" — American Bosch Arma; American Cyanamid Company; Grumman Aircraft; Florida Power & Light; Kaiser Aluminum & Chemical Corp., Michigan Bell Telephone; Smith Kline & French Laboratories; Union Carbide; Western Electric; and many, many others.



TRANSGRID PLANNING SHEET HAS MORE LIVES THAN A CAT!

The Transgrid Planning Sheet provides an ideal surface for Chart-Pak tapes and sheets. It is made of tough, dimensionally-stable DuPont "Mylar"®, .0075" thick and 36" wide, (35" print area) in lengths to 10 yards.

Pressure-sensitive materials can be pressed on and stripped off Transgrid indefinitely; its ¼"-interval grid makes positioning easy. Available with reproducible orange or black lines, or blue lines that "disappear."

NEW FOLDER TO HELP MAKE DRAFTING EASIER...

Write for free information on this new system that speeds up routine jobs – makes drafting more fun. Ask for "Visualization Made Easier."

WRITE WITH AN ORDINARY PEN OR PENCIL TO . . .

CHART-PAK, INC.

ORIGINATOR OF THE TAPE METHOD OF DRAFTING

102 River Road, Leeds, Massachusetts

Dealers in all principal cities

For more facts Circle 523 on Reader Service Card

NOW...low-cost AUTOMATION!

BUCKEYE DRILLING, TAPPING and FASTENING TOOLS

Cut production costs by employing the features of dependable, air-operated Buckeye Automation Tools:

- Small offset, as close as 1¾" center distance
- Models from 650 to 22,000 RPM
- Adjustable stroke 0 to 2" with micrometer accuracy
- Adjustable feed rate
- One type of tool features total stroke of 2", of which 1" may be fully hydraulically controlled, preventing break-through damage to material and to sensitive cutting tools . . . also incorporates adjustable rapid approach for minimum cycling time.
- Tool accessories provide signals to control mechanisms which will automatically shut tool off . . . actuate other tools for subsequent operations . . . or automatically position the next part.
- Buckeye engineers will work with you in applying these tools to fit your requirements for drilling, tapping, fastening, grinding, reaming, counterboring and wire brushing.

write today for descriptive literature, tracing templates and prices

Buckeye Tools CORPORATION

P. O. BOX 966, DAYTON 1, OHIO

Pioneering Power Tools for Industry Since 1920

meteorological influences and how to measure them. It's all here.

The book is well-indexed and well-referenced. It's intended for anyone who needs to explore the subject and wants a full treatment. And it's a good wrap-up for those who want it all in one book.

Air Pollution Manual. American Industrial Hygiene Assn., 14125 Prevost, Detroit 27. 194 pages. $8.50. (Members: $5.50.)

Industrial Relations Here and Now is a collection of 13 papers presented at an American Management Association personnel conference in Chicago. These papers define some of the problems, suggest programs and practices, as it becomes clear that yesterday's industrial relations concepts are not adequate for today's (or tomorrow's) problems. They present new and provocative thoughts on collective bargaining, wage and salary administration, communications and management development.

Industrial Relations Here and Now. American Management Assn., 1515 Broadway, New York. 123 pages. $3. (AMA members: $2.)

FACTORY is a consolidation of Factory Management and Maintenance and Factory and Industrial Management and Maintenance Engineering.

Factory and Industrial Management grew from consolidations, mergers, or absorptions involving the following publications: The Engineering Magazine; Industrial Management; Factory, the Magazine of Management; Management Engineering; Administration; Management and Administration; Management and Administration in Manufacturing Industries; Manufacturing Industries.

Maintenance Engineering grew from consolidations, mergers, or absorptions involving the following: Review of the Telephone and Telegraph; Electrical Review; Western Electrician; Electrocraft; Electrical Engineering; Electrical Review and Industrial Engineer; Industrial Engineer; Industrial Engineering; Industry Illustrated.

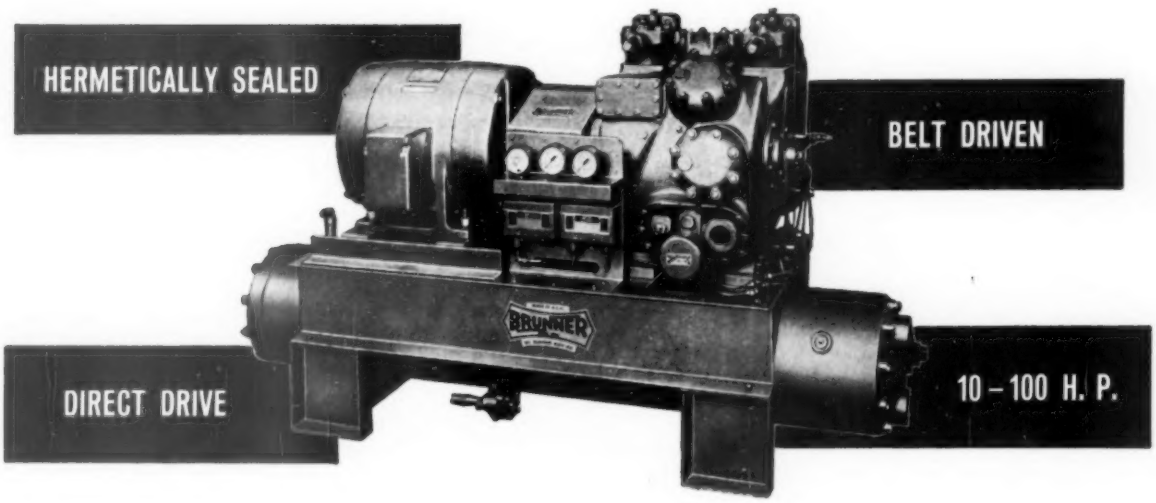
In addition, features of the publication Timely Ideas have been added.

All rights in the above names are reserved by the publisher.

BRUNNER
SINCE 1906

MULTI-DRIVE...

A UNIT FOR EVERY NEED

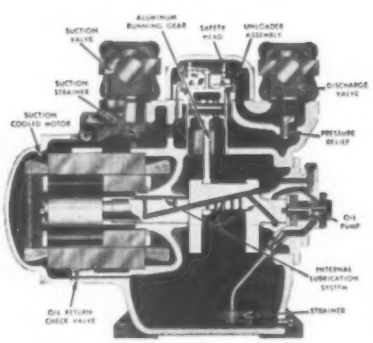


For refrigeration and air conditioning, you can select the unit you want and need . . . you're not compelled to compromise on what's available . . . when you specify a BRUNNER Multi-Drive compressor or condensing unit.

Ranging from 10 H.P. through 100 H.P. these units offer a selection which permits unlimited flexibility in specifying.

Direct drive, hermetically sealed and belt driven models are available. Interchangeability of components keeps replacement part needs at a minimum. Aluminum pistons and connecting rods, integral lubrication system, built-in capacity control and oil failure switch are just a few of the superior design and features which are standard on these units.

And behind every Brunner product is the peace of mind reassurance represented by over 50 years experience in the design and manufacture of quality compressors.



Hermetic compressors of the Multi-Drive line range in capacity from 10 H.P. to 100 H.P. and use R-22 refrigerant. Temperature ranges are from 10° to 50°F. Features include a motor stator that can be conveniently removed without the use of special tools, a safety device specifically designed to automatically trip all three phases of current as a protection against motor burnout, and suction cooled motor windings which maintain lower temperatures and assure longer motor life.

DUNHAM-BUSH

DUNHAM-BUSH, INC.

WEST HARTFORD 10, CONNECTICUT, U. S. A.

SALES OFFICES LOCATED IN PRINCIPAL CITIES

M-S-A® DURA-GRIP STAYS DOWN, STAYS SAFE

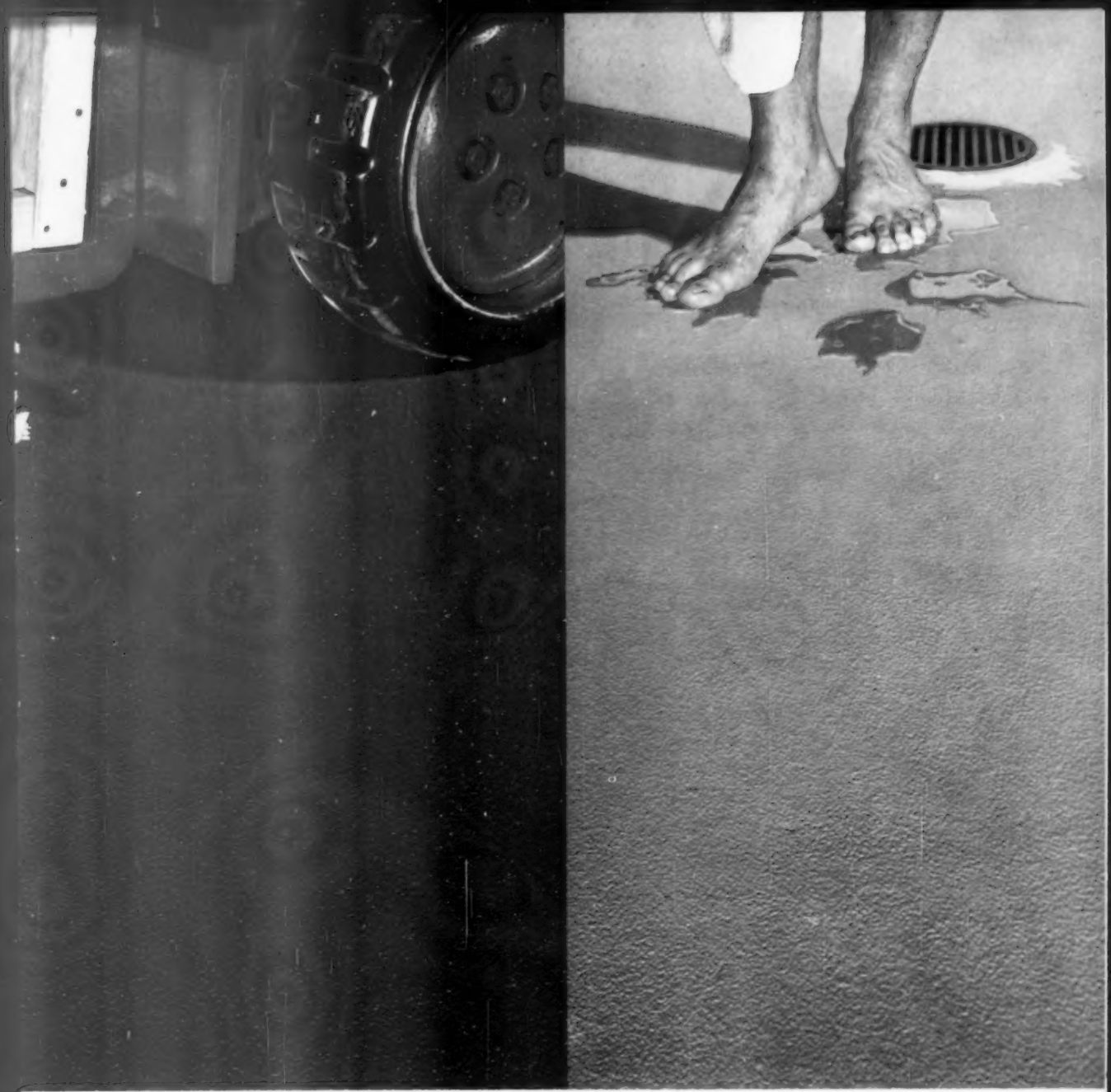
On properly prepared surfaces low-cost, non-skid, Dura-Grip will wear for years. This anti-slip surfacing compound will *not* come up. The tenacious bonding agent is a special polyurethane compound proved superior in actual customer exposure tests. Hard, protruding aluminum oxide grits put abrasive teeth in the rugged-duty locking coat.

In case after customer case "no premature resurfacing" was reported. No more on-again, off-again adhesive problems. Over 1,000 important companies have purchased M-S-A® Dura-Grip since its introduction in late 1959.

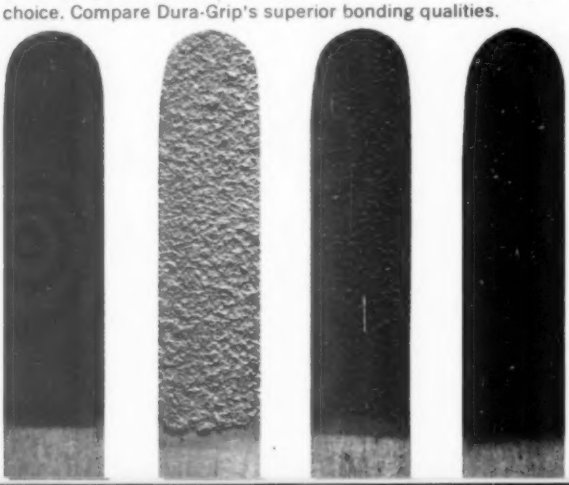
Use it on concrete. On metal, wood or marble. Inside or outside. Any place traffic could conceivably slip, slide, spin or fall.

Slip-proofs stairs, floors, ramps, catwalks, shower rooms, entrances and transportation equipment. Resists acids, alkalies, greases, oils, solvents. Gives a smooth, uniform surface.

Your choice of colors in black, gray, yellow or red. For price, delivery and application information, please write MSA on your company letterhead. And ask us for specially prepared samples shown at right.



FREE SAMPLES! Carry out your own torture test. Dip other end of free prepared sample into any other surfacing material of your choice. Compare Dura-Grip's superior bonding qualities.



MINE SAFETY APPLIANCES COMPANY
Pittsburgh 8, Pennsylvania

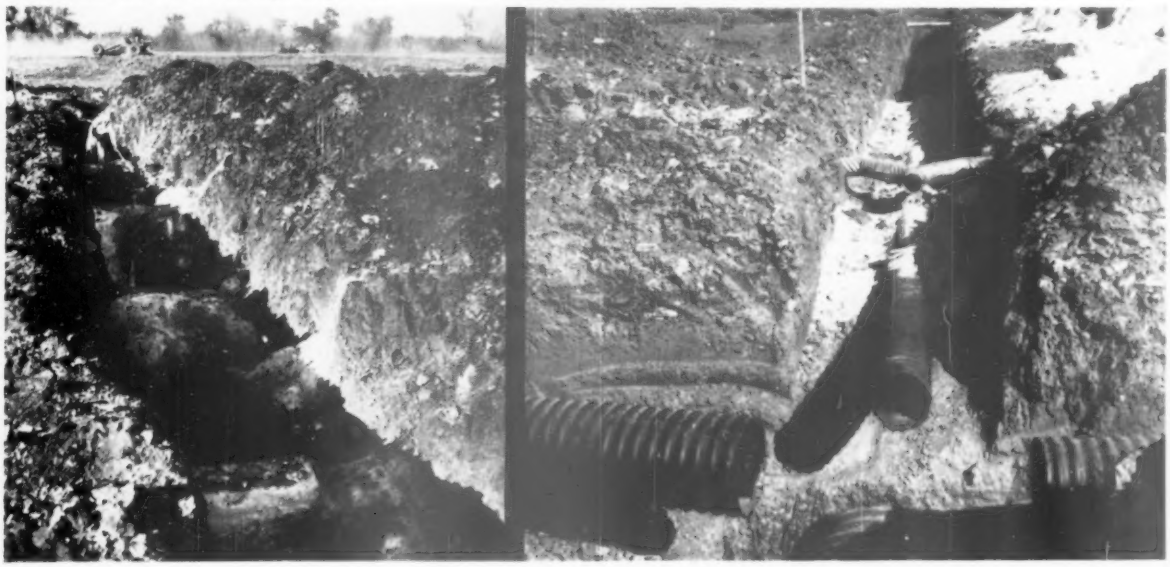
MSA

Steel for Strength Durability Economy

Armco Pipe Helps Solve Unusual Industrial Storm Sewer Problem

Uncovered here are the unusual solid limestone obstructions encountered at the Royal McBee site.

Same view as at left, after tops of pinnacles were removed and Armco Pipe installed in the trench.



In planning a new typewriter plant for Royal McBee Corporation at Springfield, Missouri, the architect-engineer firm of Giffels & Rossetti, Detroit, found "waves" of solid limestone just below ground level to hinder installation of the storm sewer system.

Several sewer pipe requirements became apparent. (1) Flexibility. (2) Positive connections. (3) Strength to bridge the rock pinnacles. Also, life-expectancy had to be equal to that of the plant.

Considering these factors, Giffels & Rossetti said, "Only one pipe material was practical for storm sewers on this plant site, and that was asphalt-coated corrugated metal pipe."

Installed for this storm sewer were 6,210 lineal feet of Armco PAVED-INVERT®, full-coated, pipe in 10 diameters from 8 to 48 inches.

For more data on Armco Corrugated Metal Pipe products for *your* applications, see your local Armco Sales Engineer, or write to Armco Drainage & Metal Products, Inc., 4051 Curtis Street, Middletown, Ohio.

ARMCO Drainage & Metal Products

For more facts circle 527 on Reader Service Card

FACTORY FILMS

Industrial Gases and Shielded Arc-Welding features recently developed welding equipment and techniques. Outlines roles played by such gases as oxygen, nitrogen, hydrogen, argon, and carbon dioxide; shows uses of these gases in Heliweld, Aircospot, and Aircomatic equipment. 16mm, color, sound, 27 min. For loan, write:

Air Reduction Sales Co., 150 East 42nd St., New York 17.

Controlling Fires is a dramatic demonstration of a new method of fire-fighting. Close-ups show how a raging fire is tamed by use of molded skylights that combine daylight with fire vents. Weatherproof, translucent acrylic skylights have heat seals that open automatically in case of fire. 16mm, color, sound, 20 min. For loan, write:

Wasco Products, Inc., Bay State Road, Cambridge, Mass.

Project Echo describes how world-wide communications may be achieved through an orbiting satellite. Shows the missile in the three stages of its propulsion into space and release of its satellite into orbit. Tells how scientists on both the east and west coasts worked to make the project possible. 16mm, sound, color. For loan, write:

Modern Talking Picture Service, 3 East 54th St., New York 22.

Casting and Erecting Concrete Curtain Walls is a how-to-do-it study of the many methods used to cast and put in place decorative wall panels. Film treats of rubber and plastic form liners, plaster-of-Paris forms, sandwich panels, and grille wall units. Illustrates methods of attaching wall panels to building frames. 16mm, color, sound, 22 min. For loan, write:

Portland Cement Assn., 33 West Grand Ave., Chicago 10.

Films in Business and Industrial Organization and Manaegment lists films for rent. Subjects range from automation through work sampling. For copy, write to:

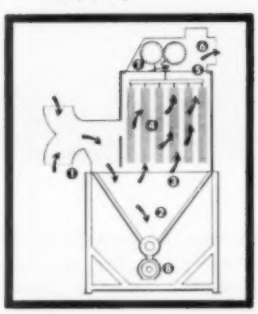
The Pennsylvania State University, Audio-Visual Aids Library, University Park, Pa.

NEW TORIT DUST COLLECTOR IS AUTOMATIC!

Save real dollars with the benefits from this *automatic* dust collector. No more interruptions on production lines! Maintenance problems are practically eliminated. This all new continuously cycling TORIT dust collector *automatically* cleans your air and *automatically* shakes its own filters and blows them clean with reverse air flow. Collected material is emptied *automatically*.

OTHER EXCLUSIVE TORIT BENEFITS

- automatic filter-shaker mechanism is simple, maintenance-free
- different dusts may be collected separately
- highest air-to-cloth ratios (from 5 to 25:1) and longer filter life
- only ¾ H.P. required for fully automatic operation
- polished 3/16" aluminum construction for minimum floor loading
- modular design—5' wide x 4'-8" long (for two sections) x 15'-6" high—saves space, lends ease and versatility to installation. Use up to 12 modular sections for each application! No limit to CFM capacity!



AUTOMATIC AND EFFICIENT, the filtering cycle of each TORIT section is self-timing. A separate blower on the clean air side keeps collector under suction. Then, (1) dust-laden air is taken into manifold; (2) coarse dust drops out; (3) fine dust is carried to filtering sections; (4) filter tubes catch dust on inside surfaces; (5) clean air emerges from filters; (6) to suction fan and clean air discharge outlet. (7) *Automatic* shaking and reverse air filter cleaning mechanism. (8) Conveyor *automatically* removes and discharges accumulated dust.

Have a cleaner plant, better morale and high productivity with lowest maintenance costs. Special design services are available based on your individual requirements. Write today for literature.

TORIT MANUFACTURING COMPANY

Automatic Collector Division, 1133 Rankin St., St. Paul 16, Minn., Dept. 334

For more facts Circle 528 on Reader Service Card

New *SpaceMaker* control is the first completely new high-voltage motor controller in more than a decade. It is the first two-high, 2 to 5 kv control center design — so compact that two complete controllers require no more floor space or head room than one conventional unit. It is also the first controller in its voltage class to feature complete drawout construction for unprecedented safety and accessibility.

Downtime for inspection and maintenance is reduced to an absolute minimum. The contactor carriage is quickly racked in and out of connect position by means of a ratchet door handle. One man can easily roll the carriage out of the control enclosure. No flexible leads or bolted connections are involved. Arc chutes and barriers simply lift out, and pole pieces rotate to completely expose the entire contact structure. Other inspection and maintenance procedures are equally simplified.

And, all inspection and maintenance are accomplished in complete safety without the need for de-energizing the bus. It is impossible to come in contact with "live" parts. Racking of the carriage is done with the metal door in closed position. Insulated shutters automatically isolate live line connections when the contactor is racked out.

TWO fit where one used to go

For complete details *of the new, years-ahead* Space-Maker *controller, call your nearby A-C representative or write Allis-Chalmers, Industrial Equipment Division, Milwaukee 1, Wisconsin.*

SpaceMaker is an Allis-Chalmers trademark.

ALLIS-CHALMERS

A-1405

FACTORY CATALOG NEWS

For more about these items, circle numbers on Reader Service Card next to back cover.

BUILDING

1—Overhead-type door. This 4-page brochure (16i-Fra) presents Filuma, said to be the first sectional door of its kind. Design of translucent fibrous glass encased in aluminum forms a strong, lightweight door. *Frantz Mfg. Co.*

2—Glass blocks, modules. Design flexibility and other advantages of colored glass blocks and sculptured glass modules are discussed in Catalog GB-115 (20 pages). Details of construction, applications. *Pittsburgh Corning Corp.*

3—Rolling door operator. Push-button control that saves labor and time is described in colorful 10-pager. Illustrates controls and special features, diagrams, specifications. *The Kinnear Mfg. Co.*

4—Gate operators. Sliding, barrier, and swinging gate operators; single- and double-gates, doors are illustrated in 4-pager (Form GAI). Includes specifications, cutaway and other photos, installation diagrams. *Robot Industries, Inc.*

AUXILIARY

5—Liquid phase heater. Facts about hot oil systems, economies in piping, and safety are discussed in No. 4023 (8 pages). Unit modulates automatically, operates up to 600 F. *Vapor Heating Corp.*

6—Air conditioning. This comprehensive bulletin (AC100) has 60 pages of information on new packaged central station a-c units. In horizontal and vertical models in 14 basic sizes—500 to 36,000 cfm. *American Air Filter Co.*

7—Gas turbine. New single-shaft gas turbine for mechanical and generator drive is presented in Bulletin 186 (6 pages). Photos and diagrams highlight design features such as multi-stage axial, three-stage turbine. *Clark Bros. Co.*

8—Vertical compressor package. Here's an 8-page catalog (V100) that discusses models VS and VE air or gas compressors. Both are standardized for 125 psi. in sizes 50 to 2000 hp. Component and other photos. *Bury Compressor Co.*

9—Filters. "Dust Topics" is a comprehensive 44-page booklet that describes equipment for dust surveys, air pollution analysis, radiation protection, and special sub-micron filtration apparatus. *Gelman Instrument Co.*

10—Heaters. This 20-page catalog (EC-261-R) presents a line of heaters that include suspension, portable, other models. Table gives easy way to estimate size of heater needed (watts-per-cu.-ft. method). Photos. *Commercial Controls Corp.*

ELECTRICAL

11—Switching centers. Selector diagrams and specifications for power-switching centers with single assembly ratings are presented in 12-page brochure (F-1700H). Shows arrangement of components. *I-T-E Circuit Breaker Co.*

12—Panels, switches. Booklet PL-12-29-660 (20 pages) is an illustrated guide, with installation and application data for general-purpose, toggle, safety, and double-throw switches; fuse panels, other equipment. *Clark Controller Co.*

13—Transformers. This 8-page bulletin (No. 160) describes new Class B ventilated dry-type transformers. Information on insulation, core and coil construction, sound-dampening and heat-curing processes. *Niagara Transformer Corp.*

14—Pilot devices. Advantages of such control devices as pressure and vacuum, plugging and anti-plugging, float, pilot, and manual reversing switches are given in Bulletin GEA-7302 (8 pages). Tables of ratings. *General Electric Co.*

15—Electron tubes. This 28-pager (CC860) is a handy reference guide to line of tubes. These include cold cathode trigger, indicator, power, radiation counter, others. Also data on special-purpose tubes. *Amperex Electronic Corp.*

16—Connectors, switches. Specifications and applications for standard and custom-built electrical connectors are given in Bulletin B81 (4 pages). Information on lamps, sockets; 2-, 4-, 6-button, and toggle switches. *Joy Mfg. Co.*

17—Control units. Design, flexibility, and color coding in three types of control units are discussed in 8-pager (PL100-1-960). Data on pushbutton and selector switches, standard and assembled-to-order stations. *Clark Controller Co.*

18—Motors. Bulletin No. 6100.1 (8 pages) describes design, performance, other characteristics of squirrel-cage induction motors. Said to be impervious to acid, abrasion, mechanical and electrical abuse. *The Lincoln Electric Co.*

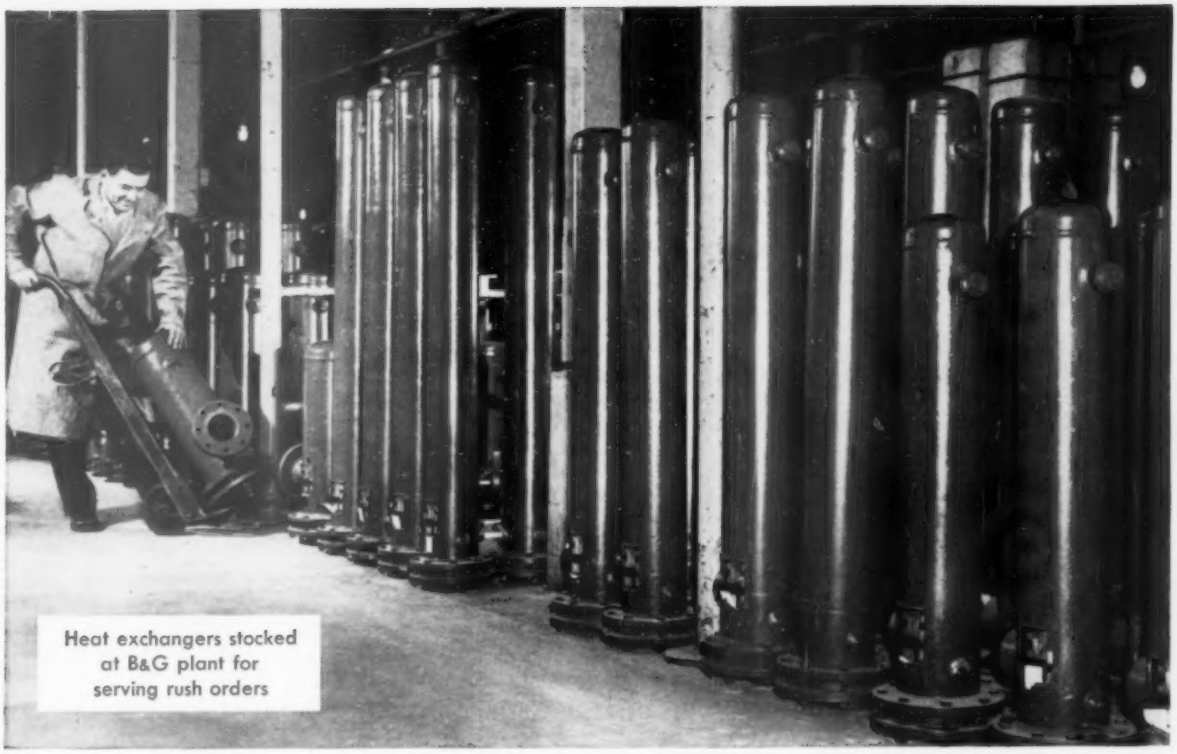
MATERIAL HANDLING

19—Fork-lift trucks. Five heavy-duty trucks for handling van-sized shipping containers are described in 6-page "Coordinated Transportation Equipment." Capacities: 14,500 to 45,000 lb. at 48-in. load centers. *Clark Equipment Co.*

20—Benches, bins, carts. New modular benches that feature interchangeability with non-pedestal legs, parts bins, and several models of stock carts are shown in comprehensive 32-page catalog. Lists other equipment. *Bay Products, Inc.*

21—Crane weight indicator. Indicator that shows lifting capacity, boom radius, total weight of load lifted is subject of Bulletin M39 (4 pages). Accurate, sturdy, easy to install. *Martin-Decker Corp.*

Turn the page



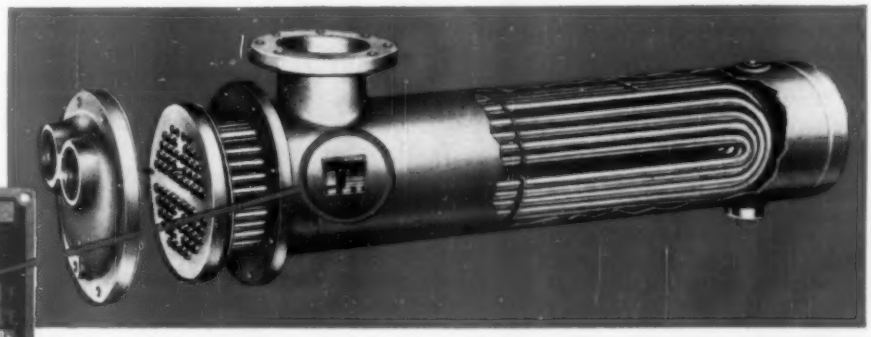
Heat exchangers stocked at B&G plant for serving rush orders

NEED A HEAT EXCHANGER IN A HURRY?

All facilities for heat exchanger manufacture are available under one roof at the B&G plant, where assembly line procedures permit building an inventory of stock parts and complete units. B&G Heat Exchangers are not only engineered to top efficiency but are constructed to the highest standards of quality and safety as required by the A.S.M.E. Unfired Pressure Vessel Code. Form U-1 Manufacturers' Data Report for Unfired Pressure Vessels is furnished with each unit as required by the provisions of the A.S.M.E. Code.

B&G Heat Exchangers are made in both U-bend and straight tube, floating tube sheet models. A comprehensive stock of U-bend exchangers is available for fast shipment. Refrigeration condensers, evaporators, liquid receivers and suction line heat exchangers are also maintained in factory stock.

Send for brochure "The A.S.M.E. Story"



All B&G Heat Exchangers are stamped with A.S.M.E. "U" Symbol

BELL & GOSSETT COMPANY

Dept. GM-13, Morton Grove, Illinois

Canadian Licensee: S. A. Armstrong Ltd., 1400 O'Connor Drive, Toronto 16, Ontario

For more about these items, circle numbers on Reader Service Card next to back cover.

22—Lift truck. "Heavy-Duty Trucks —Facts and Factors" is an informative 12-page catalog (6040A). Discusses cranes vs. trucks, special heavy-duty handling jobs, extras you get from truck versatility. *Automatic Transportation Co.*

23—Strapping tools. Here's a 60-pager (spiral-bound) on automatic strapping machines, manually operated tools, strapping, seals, accessories. Shows equipment needed to apply flat, oval, round steel, other strapping. *A. J. Gerrard & Co.*

24—Belt conveyors. Applications and money-saving advantages of portable belt conveyors are discussed in Bulletin No. 300 (6 pages). Tells how conveyors cut overhead costs in many handling jobs. Photos. *The Rapids-Standard Co., Inc.*

25—Trucks. Meeting the challenge of proper truck selection is the subject of this 8-pager. Case histories show how wrong truck selection causes low output, increased costs. Lists "how-to-choose" tips. *Automatic Transportation Co.*

INSTRUMENTS AND CONTROLS

26—Electronic controls. Illustrated 20-page handbook (F-9538) answers questions about the use of electric and electronic controls. Compares electronic and pneumatic controls. *Barber-Colman Co.*

27—Hardness tester. Selection of hardness testing equipment, and other technical data are contained in Catalog RT-60 (24 pages). Describes models for specific uses: fully automatic, motorized, others. *American Chain & Cable Co.*

28—Time recorders. Six specification sheets give details about special features, sizes, electrical requirements, methods of mounting, etc. Each model is defined for correct selection. Photos. *Cincinnati Time Recorder Co.*

29—Process control instruments. Bulletin No. 10 (8 pages) describes Microsen closed-loop, all-electronic process control systems, capacitance-actuated level detection and control instruments. Photos. *Robertshaw-Fulton Controls Co.*

30—Recorders, indicators. This 48-pager (C15-1a) highlights new modular design features, quick-changing 2- to 24-point Universal Multipoint recorder, strip and circular chart instruments. *Minneapolis-Honeywell Regulator Co.*

31—Tachometer. Three-range meter with mercury cell battery and built-in calibrating circuit is covered in brochure (No. 103-A, 4 pages). Unit is compact, lightweight (1.5 lb.), self-contained. Lists accessories. *Metron Instrument Co.*

VALVES, FITTINGS

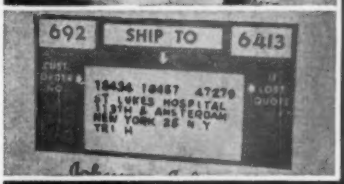
32—Regulators, valves. Three specification sheets: No. 136 covers Reliance Type P pressure regulators; No. 151, Series RV200, 201, DV-200, 201 valves; No. 152, Type PLV pressure limiting valves. Provides helpful technical data. *American Meter Co.*

33—Handwheel valves. This 4-page supplement describes valves based on Fulflo standard valves for hydraulic and oil-feeding systems and other fluids-under-pressure uses. Lists variations, sizes. *The Fulflo Specialties Co., Inc.*

34—Air control valves. Handy catalog (No. 60-1) shows new design of mechanically and manually operated valves. Includes easy-to-read chart with model numbers, specifications, operators. Lists accessories. *Hoffman Valves.*

35—Hose. Bulletin 627 is a simplified guide (12 pages) with hose styles charted in easy-to-read alphabetical arrangement. Lists 112 liquids and gases—guide shows hose to use for these various applications. *Aeroquip Corp.*

Turn the page



With "Ship To" frame pre-printed by carton maker, shipping clerk uses Multistamp Duplicator to address up to 1000 pieces of the same shipment with the same low-cost stencil . . identically, accurately, quickly, easily.

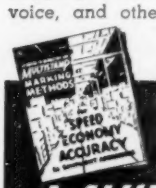
Using Multistamp FORM-CUT stencil, printing the form and fill-in data at the same time is an easy, one-man..one-hand operation. Your form is custom die-cut in the stencils . . you fill them in with ball point pen or typewriter.

MULTISTAMP **Stencil Addressing System**

Quickest Way for **Volume Shipping**

EASY-TO-READ FADE PROOF **QUICK DRYING WATERPROOF**

Shipping department addressing errors are virtually eliminated when address and routing information are printed directly on cartons by the Multistamp Stencil Duplicator. The print becomes an identical smear-proof . . fade-proof . . water-proof . . permanent part of every carton. Following simplified Multistamp Marking Methods, the address stencil is cut in the same typing which fills out shipping order, bill of lading, invoice, and other forms. One typing . . one easy operation.



Write Today for your Free copy of the illustrated new how-to and why book about the Multistamp Marking Methods.

MULTISTAMP
STENCIL DUPLICATOR (R)
THE MULTISTAMP CO. NORFOLK, VA.

ONE pump becomes MANY . . . saving you pump dollars . . . giving you a wide range of clear water, non-clog and other liquid-handling modifications . . . when you standardize your pumping operations with Fairbanks, Morse ADAPT-*ABLE* pumps.

F-M ADAPT-*ABLES* consist of a pump frame and simple adapter to which can be attached a wide variety of F-M hydraulic ends with enclosed, semi-open or non-clog impellers. Conversion is easy . . . inexpensive, too.

F-M ADAPT-*ABLES are "NEMA-Matched"*: pump mounting dimensions are standardized with similar dimensions of Nema-driving motors. Gone is the need for make-shift height-adjusting blocks and odd-bore couplings!

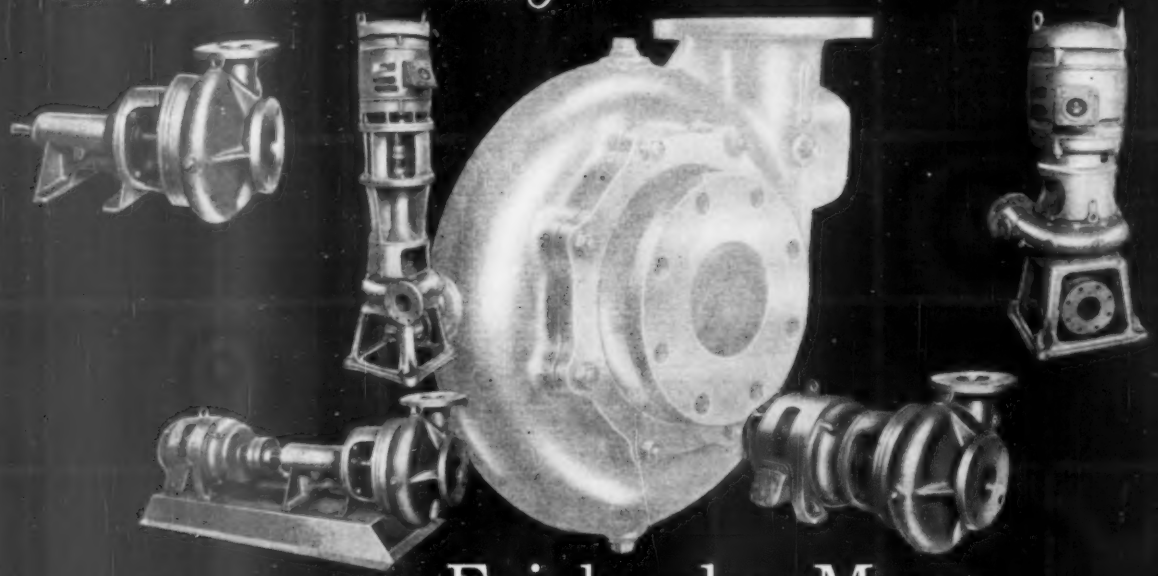
The ADAPT-*ABLE* design means that the most economical frame size may be selected to match the motor horsepower requirements of the pumping job.

And there are other advantages: choice of mechanical seals or conventional stuffing boxes with easy field change-over from one to the other . . . interchangeable bearings for pumps and motors. For special liquid handling problems, hydraulic ends can be specially alloyed to fit the needs: we've been solving such problems for generations.

Regardless of *what* liquids you pump . . . or *where* . . . Fairbanks, Morse builds pumps and *matching* power units for *your* use . . . in a greater range of sizes, types and capacities than *anyone, anywhere*. Start SAVING pump and motor dollars by putting F-M's vast hydraulic experience to work in your plants, process lines and products . . . now!

"nema-matched" *adapt-ables*

. . . a lot of pumps in ONE package!



Fairbanks, Morse

THE PROUDEST NAME IN PUMPS

Pump and Hydraulic Division • Kansas City, Kansas

A MAJOR INDUSTRIAL COMPONENT OF **FAIRBANKS WHITNEY CORPORATION**

SAFETY FIRST
DON'T TALK TO MACHINE OPERATOR
DANGER
HIGH VOLTAGE
THINK
KEEP THIS PASSAGEWAY CLEAR
SET YOUR CLOCK TO SAFETY!
BE CAREFUL
KEEP THIS PLACE CLEAN AND ORDERLY
Have 'round the clock protection with READY-MADE Safety Signs! Thousands of proven safety wordings to warn workers.
NO SMOKING
CAUTION
HARD HAT AREA
NOTICE
SAFETY GLASSES REQUIRED IN THIS AREA
Send for NEW 4-color catalog today!
Ready Made
SIGNS FOR SAFETY
Ready Made SIGN CO. INC.
Dept. F-1
115 WORTH STREET, NEW YORK 13, N. Y.
For more facts Circle 533 on Reader Service Card

Dept. F-1 **KERRIGAN IRON WORKS CO.** Nashville, Tenn.

NAME _____

FIRM NAME _____

CITY _____ STATE _____

For more facts Circle 534 on Reader Service Card

FACTORY / CATALOG NEWS

Begins on page 216

For more about these items, circle item numbers on Reader Service Card next to back cover.

36—Tube fittings. Tapered pipe, straight thread fittings, and tube reducing adapters, all using O-Ring seals, are covered in new catalog. Also describes standard steel fittings, hydraulic pressure gauges, tube benders. *The Lenz Co.*

37—Valve actuator. Bulletin VA10 (4 pages) tells about hydraulic actuator on which motor and pump run only for the few seconds needed to open or close the valve. For use on almost any type or size of valve. *Oil-Dyne, Inc.*

MAINTENANCE

38—Groove pins, drive studs. This 12-page catalog presents various types, dimensional data, and fastening details. Has information to help users design pins into their applications. Gives drive stud applications. *Groov-Pin Corp.*

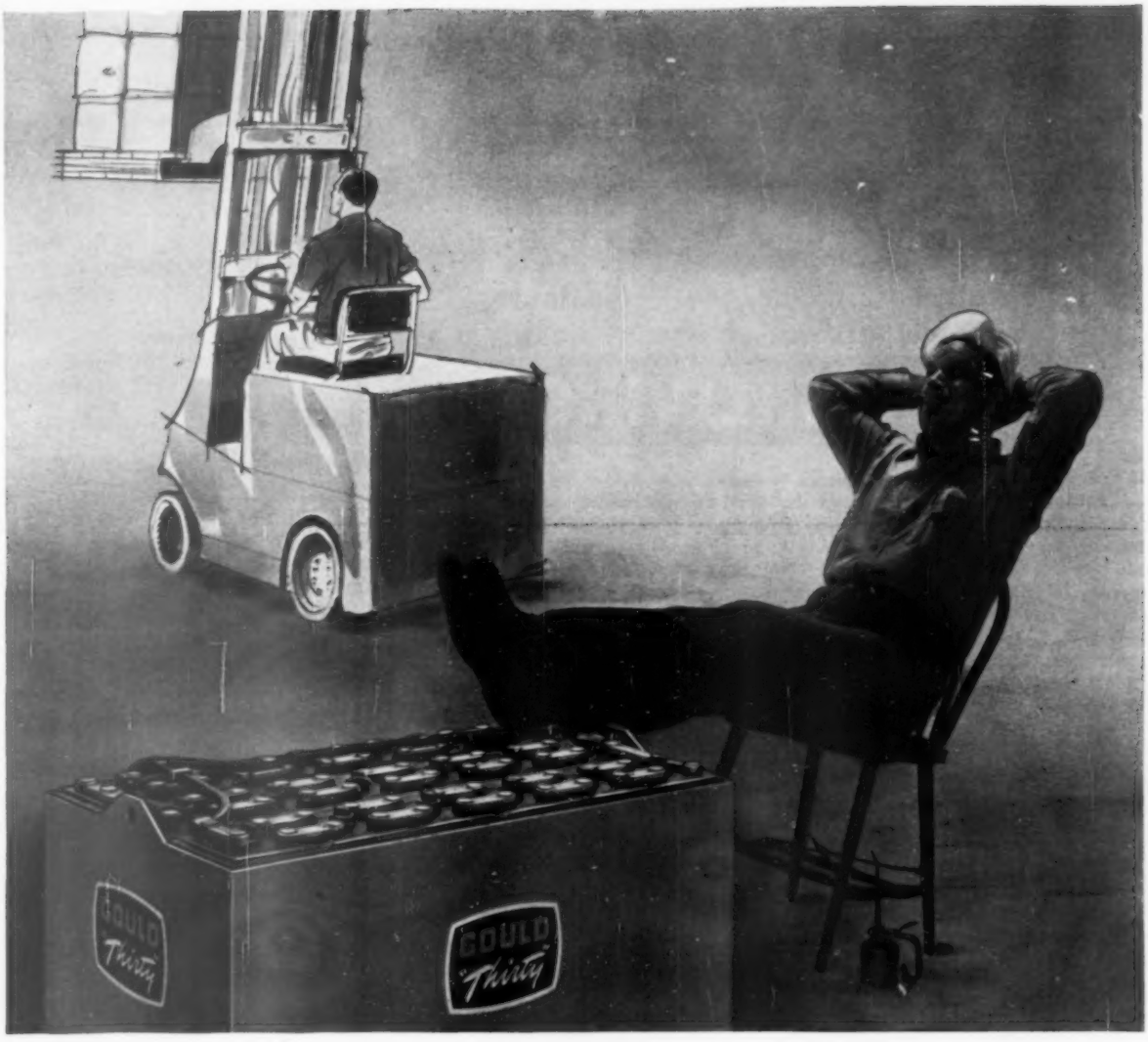
39—Filter vacuum cleaner. Here's a 4-pager (No. 191) that describes a portable cleaner for handling radioactive and toxic dusts. Said to be the first portable designed specifically for this application. *Cambridge Filter Corp.*

40—Eye, face protection. Catalog No. S-37 (16 pages) features 57 protection products and accessories. Dependable safeguards include goggles, glasses, lenses, fiber-glass face shields, welding helmets, sweat bands. *Sellstrom Mfg. Co.*

41—Shovels, scoops, spades. Illustrated 32-pager gives information about brand names, style numbers, dimensions, blade gauges, weights, and prices. Tells how to take measurements and lifts of products. *The Wood Shovel & Tool Co.*

42—Eye, face protection. This 40-pager (No. 0300-1) highlights eyewear that combines maximum protection with modern appearance. Reviews vision-testing equipment. *Mine Safety Appliances Co.*

Turn the page



Electric Trucks REQUIRE LESS MAINTENANCE

Simpler construction and fewer moving parts, combined with the vibrationless, rotary motion of the electric motors, make minimum repair and replacement on battery-powered electric trucks self-evident.

Add less maintenance to a convincing list of other benefits—lower operating costs, maneuverability, clean, quiet and safe operation—and you can easily see the main reason why users indicate a preference for battery-powered electric trucks for modern, efficient materials-handling jobs of all types.

Electric truck users generally agree on one other point, too—Gould Batteries for longer life. With the new Silconic Plate, Gould Batteries offer up to 25% longer life.

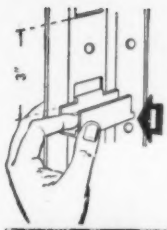
Join the list of users who prefer this ideal combination of electric trucks and Gould Batteries. For more information, write or call your local Gould representative. Ask for booklet "Why We Use Battery-Electric Industrial Trucks." Gould-National Batteries, Inc., Trenton 7, N. J. In Canada, write to Gould-National Batteries of Canada, Ltd., 1819 Yonge Street, Toronto, Ont.

More Power to you from **GOULD**

For more facts Circle 535 on Reader Service Card

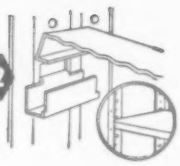
1961
will be a BIG YEAR for
BORROUGHS
America's most simple, most adjustable, most rapidly assembled line of quality
STEEL SHELVING

MORE AND MORE plant engineers throughout the nation are going all out for Borroughs Steel Shelving. They have found that Borroughs' specially formed posts give the greatest rigidity and strength . . . Borroughs' shelf support brackets save them time and money by providing the easiest, quickest shelf adjustability without nuts or bolts . . . Borroughs Steel Shelving is scientifically engineered to utilize every square inch of storage space. These facts are only part of the reason why Borroughs Steel Shelving continues to grow in nation-wide preference. Look into Borroughs Steel Shelving yourself.



Insert 4 shelf support brackets . . no fumbling with studs, bolts, nuts or lock washers.

Tilt shelf into support brackets . . . and shelf is ready for loading.



send for catalog

Represented in Sweet's Catalog
Plant Engineering File 4G BO

BORROUGHS MANUFACTURING COMPANY
OF KALAMAZOO
A SUBSIDIARY OF THE AMERICAN METAL PRODUCTS COMPANY OF DETROIT
3020 NORTH BURDICK ST. amp® KALAMAZOO, MICHIGAN

For more about these items, circle item numbers on Reader Service Card next to back cover.

PRODUCTION

43—Air tools, accessories. This 96-pager (No. 64) contains latest listing and specifications for air tools, power motors, and accessories. Shows dimensional drawings for self-feed drilling units, air hoists. *Aro Equipment Corp.*

44—Horizontal boring machines. Ruggedness, accuracy, and easy maintenance are features of the machine covered in this 20-page catalog. Drawings show construction; tables give capacities, speeds, other data. *The Bullard Co.*

45—Radial drill. New 9-in. drill, designed to speed production, increase accuracy in drilling, boring, and tapping operations, is described in 16-pager (No. R-9). Lists optional arrangements. *Giddings & Lewis Machine Tool Co.*

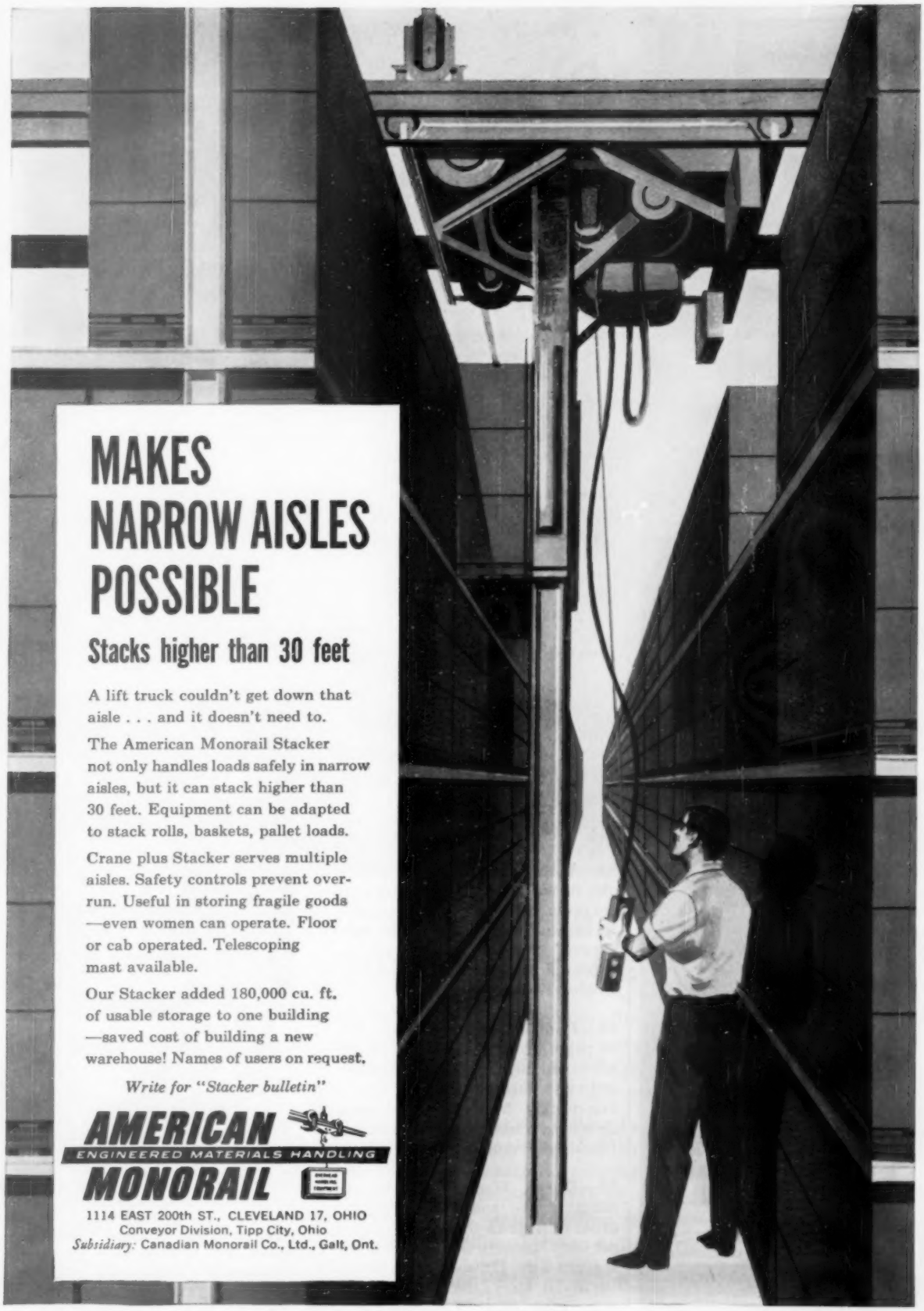
46—Tangent bending machine. Bulletin No. 13-093A (12 pages) discusses air-operated machines for rapid tangent bending of preformed metal sheets. Standard designs are single wing, duplex, quadruplex. *Taylor-Winfield Corp.*

47—Barrel-finishing machines. Here is an illustrated 4-pager with specifications and other data covering new models for deburring, deflashing, grinding, descaling, polishing, and the like. Shows before-and-after results. *Syntron Co.*

48—Chucking machines. Capabilities of high-speed, automatic 6- and 8-spindle machines are explained in Catalog No. 10 (8 pages). Photos show construction, secondary attachments that cut costs, increase speed. *The Baird Machine Co.*

49—Automation system. Bulletin MT-2 (4 pages) tells about system that offers full numerical positioning control, plus manual adjustment for error correction. For short runs, set-ups can be completed quickly. *Specialties, Inc.*

Turn the page



MAKES NARROW AISLES POSSIBLE

Stacks higher than 30 feet

A lift truck couldn't get down that aisle . . . and it doesn't need to.

The American Monorail Stacker not only handles loads safely in narrow aisles, but it can stack higher than 30 feet. Equipment can be adapted to stack rolls, baskets, pallet loads.

Crane plus Stacker serves multiple aisles. Safety controls prevent over-run. Useful in storing fragile goods —even women can operate. Floor or cab operated. Telescoping mast available.

Our Stacker added 180,000 cu. ft. of usable storage to one building —saved cost of building a new warehouse! Names of users on request.

Write for "Stacker bulletin"

AMERICAN MONORAIL

ENGINEERED MATERIALS HANDLING

1114 EAST 200th ST., CLEVELAND 17, OHIO
Conveyor Division, Tipp City, Ohio
Subsidiary: Canadian Monorail Co., Ltd., Galt, Ont.

New Designs and Applications Studied . . .

WE BUILD TO SUIT YOUR SPECS

INDUSTRY LEADERSHIP
For almost 100 Years

NORWALK

HIGH PRESSURE AIR and GAS

COMPRESSORS

Complete, integrated facilities in engineering, production and testing—at your service.

NORWALK COMPRESSORS are individually designed, ruggedly built and known for exceptional service at a low cost and a minimum of maintenance . . . Produced to specifications from single stage to six stages, from 0 to 42,000 psi pressures, for a full range of gases and air. New applications our specialty.

Phone TEmple 8-4766 in South Norwalk for prompt consultation. Detailed, descriptive Catalog 1960 available on request.

NORWALK COMPANY, INC
SOUTH NORWALK, CONNECTICUT
PHONE: TEMPLE 8-4766 *CABLE:* IRONWORKS

COMPRESSOR SPECIALISTS TO WORLD-WIDE INDUSTRY SINCE 1864

FACTORY / CATALOG NEWS

Begins on page 216

For more about these items, circle item numbers on Reader Service Card next to back cover.

50—Lathe, drills. Three 8-pagers: N-250 presents cost-saving features of new numerically controlled lathe; N-240 describes fast, accurate Cintimatic drilling; N-260 covers six-turret machine. *Cincinnati Lathe and Tool Co.*

51—Cutting machine. This 8-page booklet (Form 55-040) tells how intricate metal parts can be reproduced from pencil sketches on ordinary paper with new automated flame-cutting machine. Diagram of floor plan, cutting ranges. *Linde Co.*

52—Welding supplies. Catalog 9-13 (56 pages) covers products and accessories for gas and arc welding. Index lists items such as safety hats, fluxes and rods, spot-welding tips, Zyglo penetrant test kit. *Air Reduction Sales Co.*

53—Welder. New constant-voltage motor generator welder is discussed in 4-pager. Useful feature of this portable package: Micro-Wire welding can be done anywhere in plant without moving individual components. *Hobart Brothers Co.*

MECHANICAL

54—Variable speed drive. Principles of operation and selection data are given in Bulletin 551 (8 pages). Describes special controls for wide variety of speed control systems; tables of ratings and dimensions. *Graham Transmissions, Inc.*

55—Hydraulic motors. No. PP5 (4 pages) covers 5- and 7-cylinder low-speed, high-torque motors. Control valve changes direction of rotation quickly. Motors can be coupled directly to hoists, conveyors, winches. *Double A Products Co.*

56—Drives. Want to know how to select shaft- and flange-mounted drives? Bulletin 7100 (36 pages) not only answers this question but suggests uses. Drives come in ranges ½ to 30 hp. Tables give dimensions, other data. *The Falk Corp.*

"Slickest visual control..."

states *Factory* magazine. Entries made directly with marking pencil on a rolling "Mylar" sleeve which *moves with time,* bringing deadlines constantly closer. Entries easily erased with the swish of a cloth.

Send for **FREE GUIDE to Control Methods**
with full-scale, sample chart section

Shows how Rol-a-chart controls 22 different items: orders, production, data processing, maintenance, dispatching, sales, etc. Also expert consultation service with no obligation.

Rol-a-chart T.M.

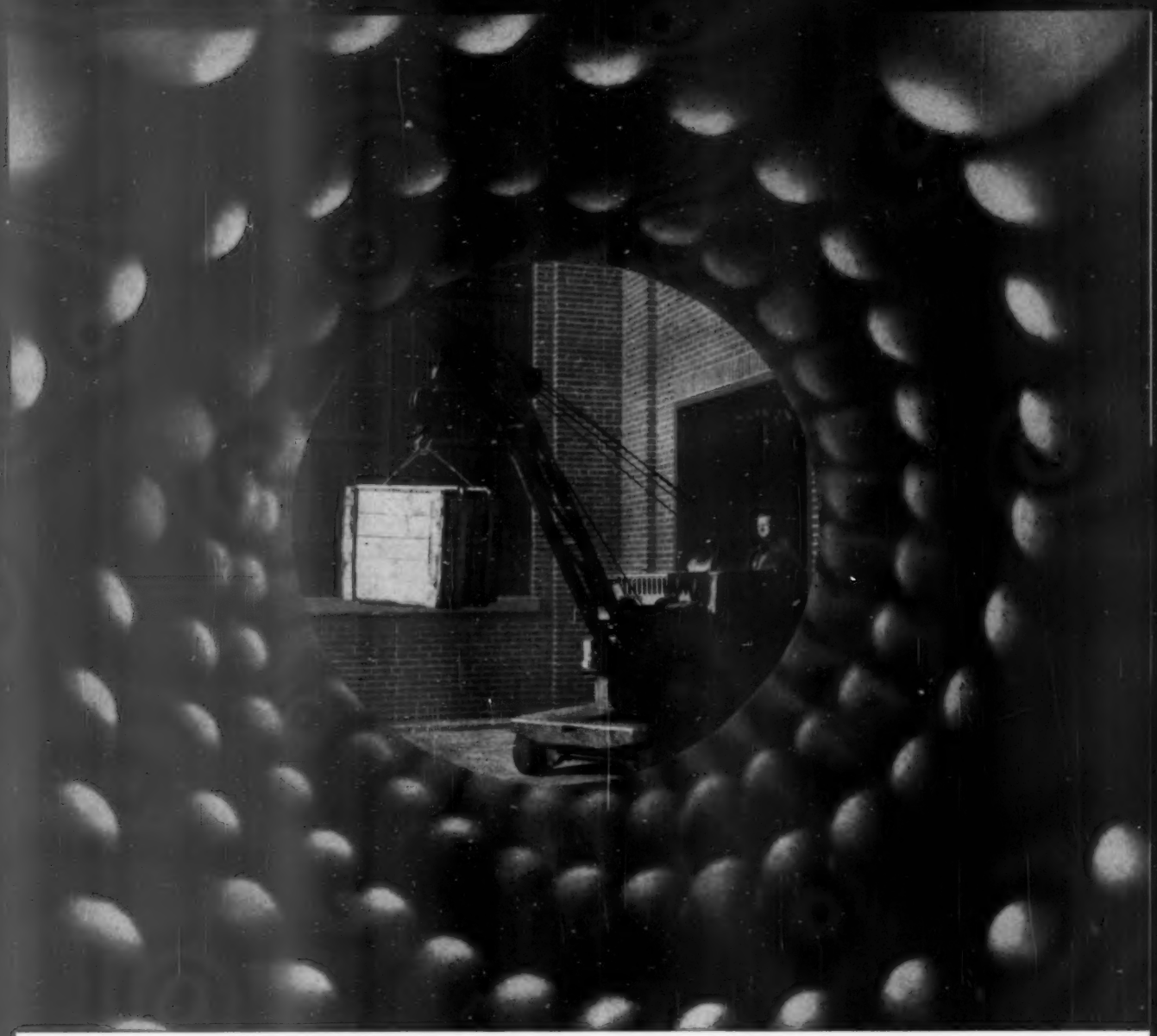
Conley, Baltzer & Steward
494 Jefferson St., San Francisco 9
Circle 539 on Reader Service Card

One
DETECTO
Speed Scale does the work of *two* operators

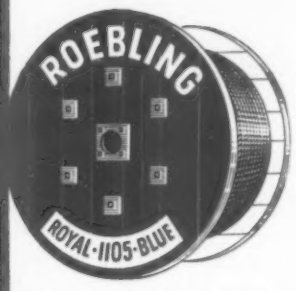
Streamline your plant operation with this trouble-free, simplified, highly sensitive scale. The slightest discrepancy of over-weight or under-weight is instantly revealed by DETECTO'S over-under indicator. Write for information on full line of industrial weighing equipment from 1/100 oz. to 100 ton: **DETECTO SCALES, INC.**
Dept. F-1, 540 Park Ave., Brooklyn 5, N. Y.

Circle 540 on Reader Service Card

 Circle 538 on Reader Service Card



ROEBLING ROYAL BLUE WIRE ROPE DESIGNED AND MADE TO SERVE YOU WELL



This is the inside view of Roebling Royal Blue — its core has been removed to show the uniformity and symmetry of the rope structure. It's not only what's outside that counts; it's what's *inside* as well. You see how concerned we are with internal security.

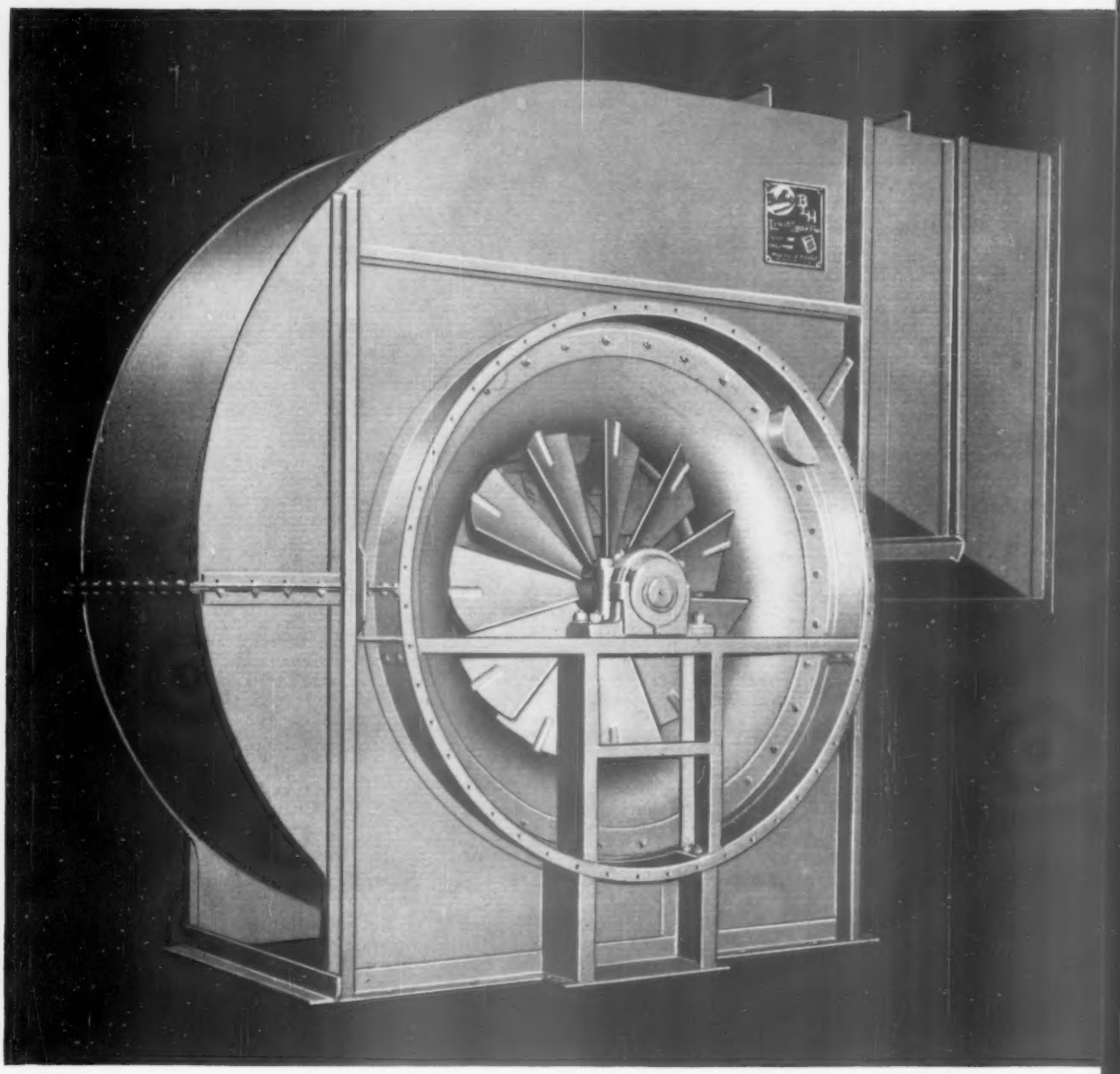
All the inspections and tests that Royal Blue goes through enable us to know that the rope we build will do what we sell it to do. These quality control measures help us — as they do you — to take the *long* view of Royal Blue. A brochure on long-lasting Royal Blue, its resistance to shock, abrasion, crushing and bending, is available on request. Ask your Roebling wire rope distributor or write to Roebling's Wire Rope Division, Trenton 2, New Jersey.

ROYAL BLUE: *We put a lot of work into it—You get a lot of work out of it.*

ROEBLING

Branch Offices in Principal Cities • John A. Roebling's Sons Division, The Colorado Fuel and Iron Corporation

For more facts Circle 541 on Reader Service Card



'Buffalo' Builds Air Handling Equipment for Every Plant and Every Air Job

EFFICIENT PLANT-WIDE VENTILATION starts with efficient fans. 'Buffalo' Type BLH Fans deliver the required tonnage of air where you want it, for the least driving power. Large installations like these are providing economical exhaust, ventilation, and air conditioning supply in every branch of industry, on a wide range of applications up to Class IV air handling. 'Buffalo' BLH Fans are furnishing air for power, air for comfort, air for efficiency and air for process and quality control—on a basis of permanent reliability and overall economy through the years.

FACTORY

Good AIR MANAGEMENT

Lowers Plant Operating Costs

FOR EXHAUSTING AIR OR MATERIALS, 'Buffalo' Industrial Exhausters are built of heavy, all-welded, frictionless steel plate housings and blades to handle the most punishing air jobs. Available with highly efficient air wheel (type AW), front-flanged material wheel (type MW), or open material wheel (type OW) without front flange. Applications range from moving clean air to abrasive and stringy materials. When equipped with heat slinger and high temperature bearings gases to 850° F. may be handled. Special construction offered for corrosive fumes.

FOR AIR PURIFICATION—'Buffalo' Gas Absorbers can clean the air for you! For removing entrained particulate matter from dryer vents, for eliminating nuisance gases from purge streams, for scrubbing or absorbing corrosive acid mists and fumes. Special designs for special applications — construction in carbon steel, rubber-lined steel, stainless and lightweight reinforced resin-bonded fiberglass for corrosive conditions.

HANDLING CORROSIVE FUMES that would quickly destroy ordinary metal fans is the specialized job of 'Buffalo' Resin-Bonded Fiberglass Fans. Fiberglass construction provides protection over a wide spectrum of acids, alkalies and other corrosive fumes, mists and gases. 'Buffalo' Fiberglass Fans are resistant to heat, corrosion, erosion, and impact — save you their cost many times over in replacement and down-time expense.

EFFICIENT ZONE VENTILATION—free air delivery or duct-connected to specified plant areas—is just what 'Buffalo' Belted Vent Sets are made for! A number of these lightweight units, can provide savings over a single large fan ventilating the same zones. Belted Vent Sets feature the quiet operation, non-overloading horsepower characteristic and high efficiencies built into the largest and finest 'Buffalo' Centrifugal fans. Capacities to 20,000 cfm.

AIR HANDLING DIVISION

BUFFALO FORGE COMPANY

Buffalo, New York

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

"Buffalo"

'Buffalo' Air Handling Equipment to move, heat, cool, dehumidify and clean air and other gases.

'Buffalo' Machine Tools to drill, punch, shear, bend, slit, notch and cope for production or plant maintenance.

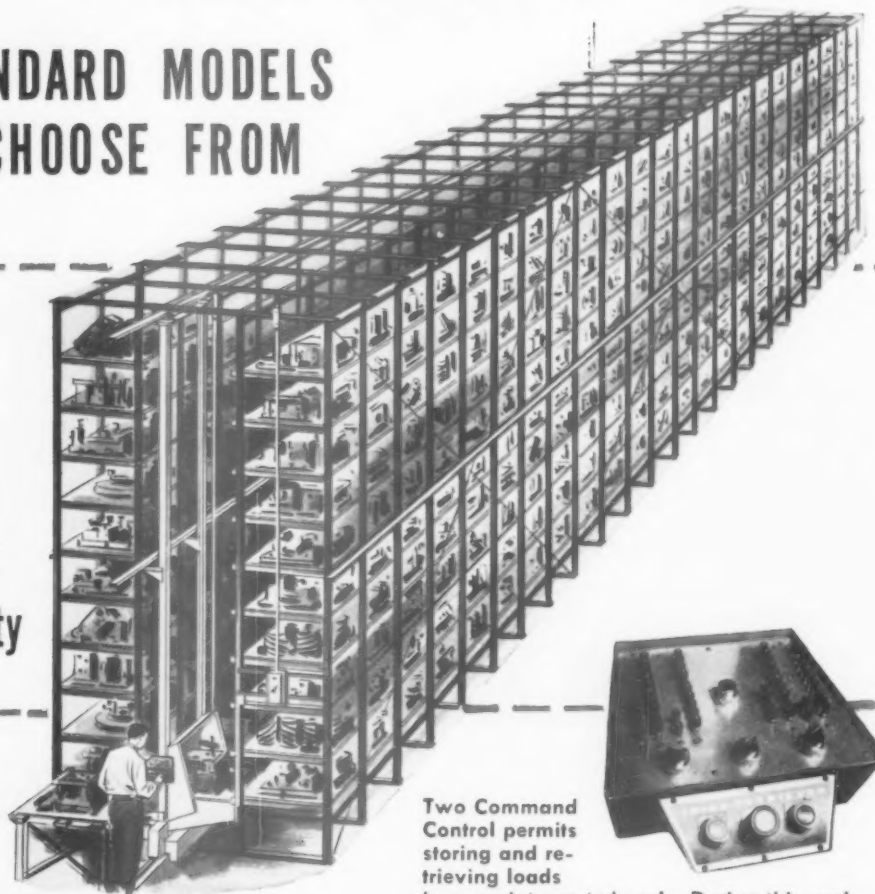
'Buffalo' Centrifugal Pumps to handle most liquids and slurries under a variety of conditions.

Squier Machinery to process sugar cane, coffee and rice. Special processing machinery for chemicals.

PUSH KEY MATERIAL HANDLING AND STORAGE with the TRIAX® RETRIEVER®

19 STANDARD MODELS TO CHOOSE FROM

Pre-engineered Modules... from 12'–24' height 1000 lb. capacity



Two Command Control permits storing and retrieving loads in an uninterrupted cycle. During this cycle, the operator is free to perform other duties.

PERPENDICULAR DIMENSIONS	LOAD DIMENSION PARALLEL TO AISLE 18″	24″	30″	36″	42″
24″	R34	R44			
30″	R35	R45	R55		
36″	R36	R46	R56	R66	
42″	R37	R47	R57	R67	R77
48″	R38	R48	R58	R68	R78

Other units are available up to 2500 lb. capacity. For further information write or call . . .

RANDOM STORAGE . . . PINPOINT LOCATION

Floor-to-ceiling storage with a Triax Retriever can save up to 70% plant area or labor . . . and offers immediate access to parts, tools, dies or inventory in storage.

The R-46 illustrated contains 460 openings with a total of 2760 square feet of storage space. It occupies only 550 square feet of floor space. Load height is 13″ including a 1″ slab pallet, but can be varied to meet your needs.

Triax now offers a wide range of R-Series Retrievers to fit your individual requirements.

THE TRIAX COMPANY

SWeetbriar 1-9800

11955 SHAKER BLVD. • CLEVELAND 20, OHIO

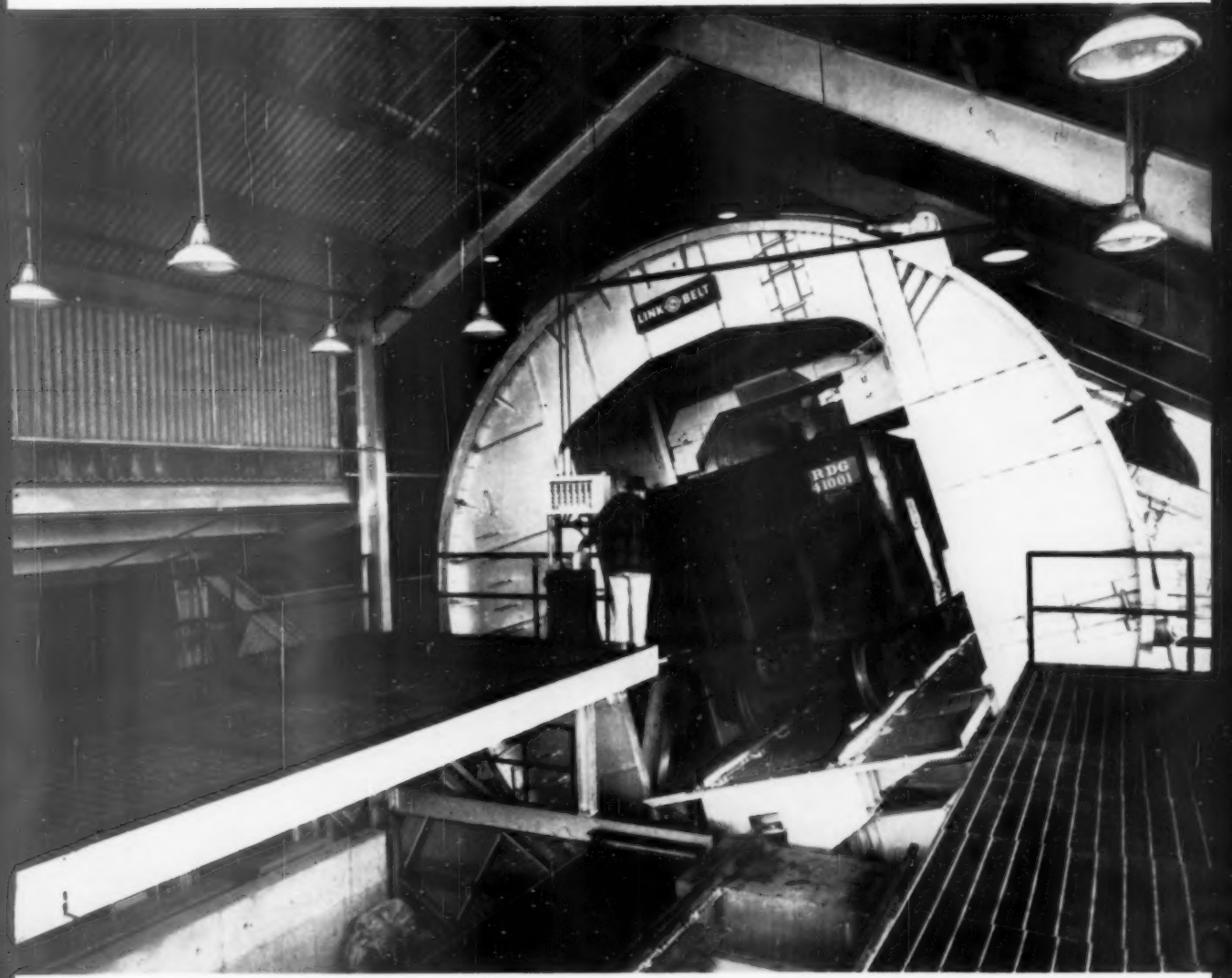
FACTORY

228

For more facts Circle 543 on Reader Service Card

FACTORY

PLANT OPERATIONS CASE BOOK



DUMPS UPHILL **Hopper car rolls up 30-deg. incline to dump its cargo . . . page 231.**

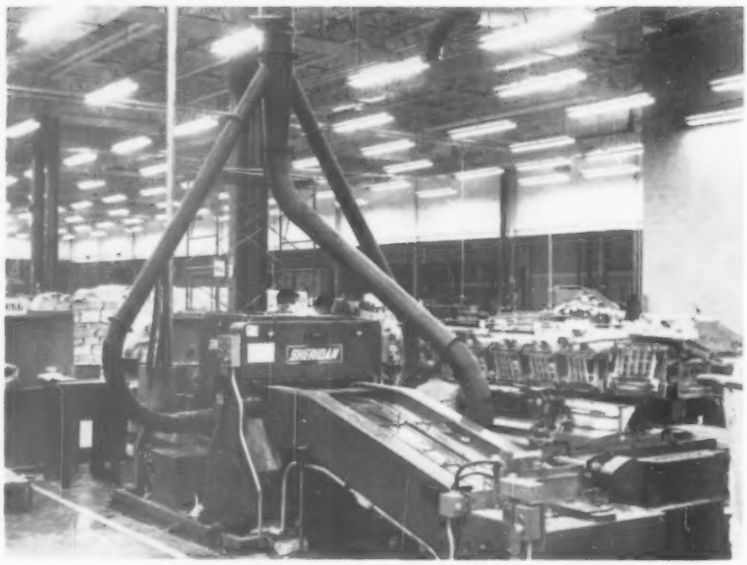
TABLE OF CONTENTS FOR THIS SECTION ON NEXT PAGE►

FACTORY
CASE BOOK

NORMAN H. SOLON, EDITOR

No. 39 January 1961

Airing out scrap problems 230
Restless train lifts and rolls 231
Tank car KP is a cinch with this hydraulic jet 231
Reformed lazy susan welds two at a time 231
Scooters for trouble shooters 232
The safety story at a glance 232
School for bosses 232
Storage in miniature takes little space 232
Pinpointing costs 233
Nuts-and-bolts chef cooks lasagna 233
Scrap-yard feeder ups output 233
International ideas 233
Is your plant safe from fallout? Find out 233
Suitcase respirator 234
Making templates fast 234
Data by pushbutton 234
Borescope looks around corners 234
Alert workers sparked these cost-cutters 235
The phantom job opening 236
Custom lockers aid housekeeping .. 236
Disaster data with the cha-cha 236
Robot trains make drivers obsolete 237
Corrugated cartons give skids the slip 237
Case Book capsules 237
Boards are one-stop information centers 238
Pinball machine lights up the count 238
White-collar thieves 238
Machine memorizes mill measurements 238
Merry-go-round jigs get the brass ring 239
Safety police look behind accidents 239
Tell 'em and show 'em 239
Outside elevator breaks bottleneck 240
Electrostatic cleaner puts an end to mess 240
Lie detector weeds out misfits 240



Scrap is picked up here . . .

. . . and carried to baling room

Airing out scrap problems

Some 40 tons of scrap paper are efficiently handled and baled each day at Meredith Publishing Company, Des Moines, Iowa. A controlled air duct scrap removal system (Chicago Machine Tool Corporation, East Chicago, Ind.) does the trick without bottlenecks, despite peaks and valleys in production.

One man at a "five-situation" control board supervises the operation. His choice depends on the waste load—where it originates, and how much there is of it.

The scrap paper is picked up by air ducts at paper trimmers along the production line. If the baling machine is working, the scrap is routed to large dust separators on the roof, and from there is ducted to the balers. In most cases, however, the baler won't be in operation. Then the scrap is sent to a special storage room until the baler is able to accommodate it.

Pushbuttons determine the route. For example, if one of the dust separators is full, the operator pushes another button and the scrap is routed to the second separator. If both separators are tied up, a third button sends the scrap to the storage room.

The system also handles scrap other than paper. This is loaded on pallets and truck-lifted to the hogger

near the baling machine. After it's torn apart, it goes into the baler with the scrap paper. In this way, all scrap is baled. In the past, bulk scrap had to be loaded on the freight car in 300-lb. lots. Now the balers compress the scrap into bales 5 feet long, weighing an average 1200 pounds. These can easily be fork-lifted from the balers to the railroad sidings.

Restless train lifts and rolls

(Cover Story)

This hopper car literally dumps uphill at National Sugar Refining Company's Philadelphia plant. It rolls along the 30-deg. incline (left of photo) while rotating to unload sugar. This actually unloads the sugar into a pit 10 feet above the level of the track.

Use of a conventional car roller at the plant is not feasible for space reasons. The sugar has to be delivered to the high area because of the extremely high tide level at the unloading dock. And there isn't enough space to gradually tilt the track up. This idea can be adapted by plants, in lieu of a sophisticated conveyor system, to bring materials up to any level.

The dumper can accommodate standard open-gondola railroad cars of up to 97 tons, including cargo and car. Total dumping time takes only three minutes.

The cars are held in position by two sets of automatic beam-type clamps. Each clamp has its own lowering and holding equipment, including a 5-hp. motor.

The dumping system was manufactured by Link-Belt Company, Chicago, in conjunction with Austin Company, Cleveland.

Tank-car KP is a cinch with hydraulic jet

Hydraulic jet cleaners have slashed the cleaning time of tank cars to eight hours at Rohm & Haas Company's Philadelphia plant. The cleaning cycle formerly took from 48 to 72 hours.

The air-operated rotary cleaning head has a dual nozzle attachment that ejects water mixed with a caustic cleaning compound. The liquid is supplied by a circulating pump, and heated to 180 F. by exhaust steam from the turbine that powers the pump. Here's how it works:

The head is lowered into a tank car that has been drained of its contents. The two nozzles rotate both horizontally and vertically in a predetermined pattern, with an effective cleaning range of 50 feet. Every square inch of the car is hit by the fluid. There's no waste of fluid, however. The overflow is filtered to remove the dirt, then returned to the nearby mixing pit for recirculation.

Formerly, the company had to drain tank cars and then flush them several times with 6,- to 10,000 gallons of water. Caustic compound had to be added and steam introduced to provide the necessary heat and agitation.

The jet cleaner is made by Sellers Injector Corporation, Philadelphia.

REFORMED LAZY SUSAN WELDS TWO AT A TIME

Some 1300 assemblies can be welded in one hour at Western Electric Company's Indianapolis plant with this machine. The lazy susan table feeds a dual electrode, head resistance welder. Each of the eight fixtures on the table can handle two clamp assemblies. The dual machine welds two assemblies simultanously. The heads are electrically in series and current passes from one to the other via the parts and fixtures. An equalizer bar maintains equal pressure on both heads. Table and welder are made by Precision Welder and Flexopress Corporation, Cincinnati.

Scooters for trouble shooters

Maintenance help is just five minutes away anywhere in the sprawling 2.5-million-sq.-ft. Gates Rubber Company plant in Denver. These plant-made three-wheeled scooters have mechanized the function.

And it has paid off. For example, an electrical department worker riding one of these 33 "chore-boy" carts can install 150 to 200 bulbs during an 8-hour shift. Industry-wide figures indicate that it takes an average of half a man-hour to change a single lamp. The electrical department also uses scooters to get their trouble shooters on the job in a hurry.

The welding shop uses eight chore boys to tow portable welding units throughout the plant. Both arc and oxyacetylene units are mounted on the carts. The welder himself does the driving, thus eliminating need for a second worker. In one month some 600 to 700 trips are made for welding purposes.

The carts are also used by the building and grounds department and the janitor service. Two carts are loaded with lubrication equipment to oil heavy machinery. Department supervisors use the carts for inspection purposes.

The carts are small flat-bed trucks powered by 5.8-hp. engines. They cost less than $1000 to build. Maintenance is no problem. Downtime averages just 4 to 5.3 hours a month per vehicle, including a preventive maintenance check. And parts replacement for the average cart comes to $8 a month.

School for bosses

A recent production cutback curtailed the work load of some 500 salaried supervisory and administrative employees at Lone Star Steel Company, Dallas, Tex. But the men weren't reduced to idleness.

A three-week classroom training program was set up to take advantage of their free time. These courses, taught by instructors from Southern Methodist University and Texas A&M College dealt mainly with modern economics, stressing the problems that led to the slowdown. Other lectures dealt with human relations, communications, and job instruction for supervisors.

Guest speakers from the petroleum industry also lectured.

Storage in miniature takes little space

This type of storage takes up a minimum amount of space at Essex Electronics Division (Berkeley Heights, N.J.) of Nytronics, Inc. All that's needed is a wall.

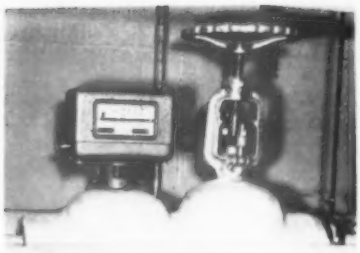
Tiny slots in the wall-mounted offset panels toward the rear of the shipping department are used to store sub-miniature chokes. They're small—one-million chokes can be packaged in 5 cubic feet.

The chokes are stored in plastic shipping containers. They are identified for shipping by symbols representing electrical values.

This wall storeroom technique can be adapted by any plant that keeps a substantial inventory of miniature products.

HERE'S THE SAFETY STORY AT A GLANCE

Boards like this, spotted throughout Scott Paper Company's Winslow, Me., plant, are a constant reminder of the need for safety. A blinking green light means there has been no lost-time accident in a particular department during that month. A red light means there has. This system makes safety a competitive game. The boards acting as scoreboards have proved excellent attention-getters.



Pinpointing costs

This Btu. meter takes the guesswork out of figuring heating costs at Personal Production Corporation's Milltown, N.J., plant. It pinpoints the exact amount of Btu. consumed in the entire building for a given period of time.

The German-made meter is distributed in the U.S. and Canada by Air Conditioning Equipment Corporation, New York.

Nuts-and-bolts chef cooks lasagna

Vending machines mean more than just cold ham on rye and coffee at National Lead Corporation, Perth Amboy, N. J. Hot meals, such as roast turkey, Swedish meatballs, and lasagna, are cooked by these mechanical chefs. And they're served at the touch of a button.

The machines (Continental Industries, Inc., Westbury, L.I.) cook food from the frozen state and serve it piping hot.

The all-mechanical cafeteria also vends soups, sandwiches, salads, ice cream, soft drinks with ice, coffee, pastry, rolls. And workers don't have to fumble for change—there are currency-changing machines.

Hot meals can be served on a non-subsidiary basis at from 30 to 50 cents each.

According to Continental, this type of operation is feasible in some 283,000 plants in the U. S.

Scrap-yard feeder steps up output

A bit of ingenuity, plus some scrap iron and electric valves, built an automatic feed for this rod-straightening machine at Continental-Emsco Company, Garland, Texas. It has paid off in a production increase of 30%. And a cut in labor savings of $5000 a year.

One operator used to feed the straightening machine manually, while another worker at the rear took out the rods. This system required two shifts to keep up the production schedule.

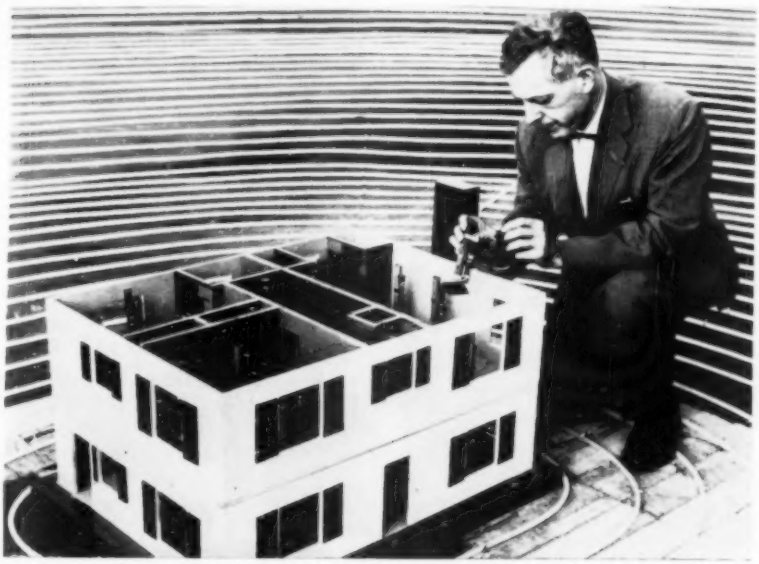
Now one man can do the job in less than one shift. He picks up the rods with a crane, sets them on a rack to roll down to the feeding device. The feed is controlled by limit switches, an air cylinder, and timing devices.

The operator's work load has been lessened to the point where he can also handle a shot blasting machine, into which the rods are automatically fed from the straightening machine. This new operation has resulted in an improved product and a cleaner plant.

International ideas

Employee suggestion plans are not a monopoly of the United States. For example, 37,000 proposals for industrial improvement were made by workers in West German plants. And 50% were found practical.

Some $450,000 was paid to the originators of the suggestions.



IS YOUR PLANT SAFE FROM FALLOUT? FIND OUT

A test that actually simulates an atomic attack on a building is being conducted by Technical Operations, Inc., Burlington, Mass. This method can check the radiation protection afforded by new plants while they're still on the drawing board. A small model of the building is placed in the bull's-eye of a target representing distances. Gamma rays, produced by small amounts of Cobalt 60 housed safely in a 1500-lb. lead container, are measured on dosimeters located in different areas of the model. The radioactive source is propelled from its container by a hydraulic pump into a polyethylene tubing wound helically around the target.

Suitcase respirator

Portable airline respirators keep air fresh for employees working in cramped quarters at Convair Division (San Diego, Calif.) of General Dynamics Corporation.

Streamlined to suitcase size, the units filter the air, removing oil, water, and objectionable odors. They're especially effective in small areas where solvents are used. It isn't possible for a worker to haul conventional bulky respiration apparatus into the cramped working space of such areas.

The respirators (Scott Aviation Corporation, Lancaster, N. Y.) can be plugged into the plant's compressed air outlet. Only the face mask and attaching hose must be worn by the worker. The filter itself is locked right into the suitcase. One unit supplies air for two people.

Making templates—like donuts—fast

This thingamajig has slashed the time for cutting precision holes in templates from five minutes to one at Lockheed Aircraft Corporation's Marietta, Ga., plant. What's more, the holes are more nearly perfect than under the old band-saw method of cutting.

Basically, the plant-made device is an 18-in. platform with the head of a standard hand router projecting through its center.

The circle to be cut is prepunched at its center and radius. This is done with a device normally used to make lightening holes. (It punches in increments of a ½ inch up to 15 inches in diameter. And it can be adjusted for in-between sizes.)

After these "anchor" holes have been punched, the metal is placed on the platform, with the center hole on a pin and the radius hole on the router head. As the head turns, the metal is held against it and guided around the circle.

The slower, less accurate old method involved cutting by band saw. First, a rough hole was punched within the circle area. Then the band-saw blade was released and threaded through the hole. This meant the blade had to be released and re-threaded for each new cutting.

Data by pushbutton

Just 15 seconds after a button is pushed, information from any one of a thousand cards is flashed on a screen at Hughes Aircraft Company, El Segundo, Calif. This plant-built automatic card sorter and projector does the trick.

The device has several uses throughout the plant. Engineering services, for example, plans to use the unit for a file of procedures, specifications, preferred circuits, and engineering tables. It will eliminate the tedious job of manually searching through files.

Cards costing 12¢ each are random-filed in magazines, each of which has a 1000-card capacity. The unit selects and projects the desired card on a 12x18-in. screen. Any card may be removed from a magazine and a new card substituted by turning the key-lock device. Magazines are coded for easy identification and can be easily loaded or removed from the unit. A magazine library of infinite size can be serviced by a single unit.

Borescope looks around corners

Illuminated periscopes literally allow inspectors to look around corners at Weston Hydraulics, Ltd., (Van Nuys, Calif.), subsidiary of Borg-Warner Corporation. They're used to check internal spots in long barrels, castings, and piston rods that are impossible to inspect by normal optic methods.

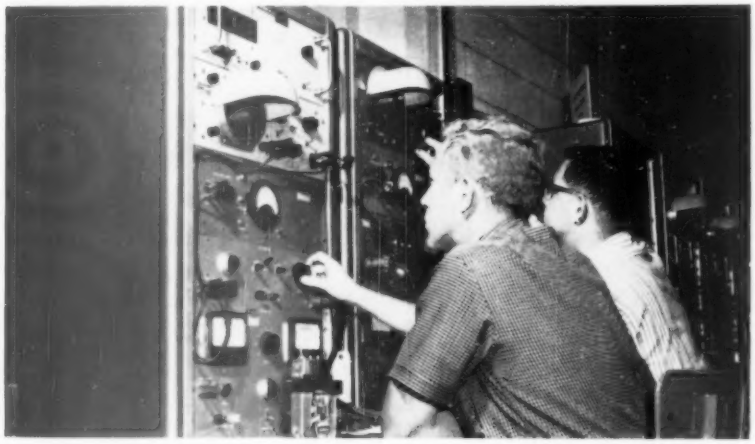
The Borescopes (National Electric Instrument Division of Engelhard Hanovia, Inc., Elmhurst, N.Y.) are used with insert sleeves for comparative gauging. Accuracy can be checked to 0.001 inch.

The device has outside diameters ranging from 0.093 inch to 2.5 inches and lengths from 3 inches to 72 feet. It's available in different types to allow vision at right angle, straight forward, forward oblique, and rearward. The standard field of vision is 55 degrees.

Reprints of the Plant Operating Case Book are available. Price 50¢. For quantity prices, write Reader Service Department, FACTORY, 330 W. 42nd St., New York 36.

Alert workers sparked these cost cutters . . .

. . . at Lear, Inc., Grand Rapids, Mich. And they all involve low-cost plant-made equipment that could easily be copied in most plants. Here are a few examples of what can be accomplished when employees join management in striving for methods improvement. Payoff is production efficiency.



Shading out optical errors

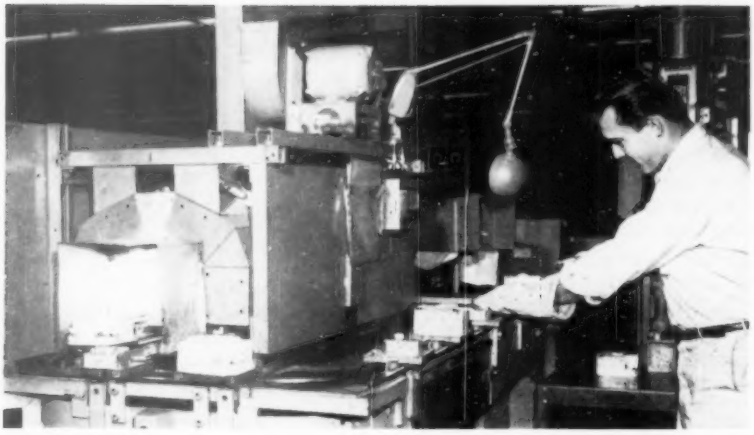
Plastic eyeshades insure that technicians taking oscillograph readings are not bothered by parallax. Previously, bright overhead lights and shadows combined to cause optical illusions and misreadings.

These plant-made eyeshades cost only 20 cents (in labor and materials) and can be used for various types of gauges and screens.

Storage rolls on trolley tracks

Mobile storage has cut space requirements by 40%. Standard bins were modified by maintenance crews to permit them to ride trolley tracks embedded in the floor.

Now only one aisle is needed to provide access to seven or eight rows of bins.



Infra-red unit does a hot job

This infra-red oven turns out a near-perfect vacuum soldering job for critical electronic parts. Only five parts per million have to be checked for quality control purposes. The plant-made infra-red unit gives even, controlled temperature.

Induction methods and a hand torch did the job previously. However, the rejection rate ran as high as 51% with the former method and 95% with the latter.

YOU BE THE ARBITRATOR

THE CASE OF

The phantom job opening

Out of the experience of the American Arbitration Association

Howie B., an inspector on a sand-blasting machine, decided to transfer to another job. He had enough seniority for the move. The union expected his former job would be posted and filled by moving a senior applicant up the ladder.

But management had other ideas. Things were slow, so it decided to leave the job unfilled. When necessary, one of the higher-paid employees in the department could work on the sand-blasting machine. The contract permitted men to fill temporary assignments at lower-grade work provided they got their regular pay.

The union objected to the plan. "Some of the men have been waiting for a chance to get promoted," the chief shop steward explained. "Now that an inspector's job is vacant you have no right to refuse to fill it in the manner prescribed by the contract."

"Just because a man left a job doesn't create a vacancy," answered the plant manager. "A vacancy exists only when we decide we need a regular man at it. If we replaced Howie there wouldn't be enough work for some of the higher-rated men and we'd have to lay one of them off."

Eventually the case went to arbitration. Suppose you were the arbitrator. How would you rule?

For the actual decision turn to page 240

Custom lockers aid housekeeping

Want to make your plant lockers a cleaning man's delight? If so, C. D. Cannon, manager of engineering services, Penco Division (Oaks, Pa.) of Alan Wood Steel Company has the following nine suggestions for you—they'll pay off in over-all better housekeeping:

1. Sloping tops: These lockers (photo) slope at a 30% angle and prevent accumulation of dust and débris common with flat tops.

2. Closed base: a steel base that covers the open space under conventional lockers eliminates a dirt-catching area. It also gives the locker room eye appeal.

3. Filler panels: Steel panels to match the lockers can be used to fill openings caused by columns and obstructions that interfere with the arrangement of lockers in orderly, continuous lines.

4. Recess trim: Molding trim can be used to fill the gap along the top and the ends between the edge of the opening and recessed lockers. If left uncovered, the gap makes the installation unattractive and hard to keep clean.

5. Louvers: Extra louvers can provide circulating air lockers used to store work clothes.

6. Mesh doors: Besides providing air circulation, they permit inspection without opening doors.

7. Perforations: Additional circulation can be provided by perforations in backs and tops.

8. Vertical partitions: These come in handy when dirty clothes are stored in the same locker with clean garments. A full-length vertical partition extending from the back to the door prevents soiling.

9. Locks: Standardized, built-in locks make installations look neater than an assortment of padlocks provided by individual occupants. They also solve the problem of lost and misplaced locks.

Disaster data with the cha-cha

Some 500 plants in the Metropolitan New York area are tied in directly to the local Civil Defense organization. Muzak Corporation, New York, which pipes in background music to these plants, has integrated its line facilities with the city's C. D. warning system.

In any emergency a microphone at C. D. headquarters can break into the Muzak line for instant transmission of warnings. The system will only be used in case of dire emergency. No preliminary tests or practice drills will be held.

The system will be used not only in the event of an air raid, but also to warn of other impending disasters, such as hurricanes, tidal waves, and tornadoes.

A tie-in with other C. D. organizations in the U. S. is planned in the near future, according to Muzak.

Contributions from readers reporting experiences will be welcomed. No need for fancy writing; just a clear, concise statement of facts. If you have photos or drawings, be sure to include. We'll edit for the Case Book. Contributions accepted will be paid for at time of publication. Address: Case Book Editor, FACTORY, 330 West 42nd St., New York 36.

Robot trains oust drivers

These tow trains run by themselves. Well, almost. They're used by British Railways to move goods at its Wolverhampton, Eng., station.

The Robotac battery-operated trains (E.M.I. Electronics Ltd., Hayes, Eng.) follow a single wire laid ½-inch under the floor surface. They'll never get a ticket for speeding. Top speed is 2 mph.

A magnetic field surrounding the wire guides the trains. This field causes a voltage to be induced in two sensing coils underneath the tug. Since the system is operated remotely, safety is the number one consideration. If the train wanders off its course, voltage in one of the coils automatically increases, activating a steering mechanism that puts the tug back on its path. If this fails, a relay is activated which sets the brakes. A sensitive switch in the bumper of each tug automatically halts the train if it encounters some obstacle.

The robot train system has several routes. Each tug is fitted with an electronic program control unit that determines its route. Sequence of stopping points is prearranged by pushing numbered switches on a central control panel. Coils buried in the floor and energized by the track current stop the trains. As trains reach stopping points, corresponding signals light up on the central control panel. Thus, a dispatcher always knows where every train is.

If the current or control panel should fail, the tugs can be manually controlled by an easily attached tiller control.

Sliding drawbars push the cars together accordion-style at the discharge point, thus reducing walking during loading and unloading.

Corrugated cartons give skids the slip

Packaging time has been slashed 80% at De Laval Steam Turbine Company, Trenton, N.J., through use of corrugated cartons for shipping. The company formerly used open skids to ship gear speed reducers.

Under the old system it took one man 30 minutes to mount one unit on a skid. He had to cut a mounting board to size and then drill holes to mount the unit.

With corrugated cartons (Union Bag-Camp Corporation, New York) one man can do the job in six minutes. All he has to do is fold over the bottom flaps of the carton and staple them. Then place the support pad in the carton and lower the speed reducer into place. To close the package, he folds over and staples the top flaps.

Payoff: a reduction in labor costs from $1.25 to 25¢ per unit. And protection of the product from weather hazards.

CASE BOOK CAPSULES

Electrical power for small-engine ignition systems can be generated by means of a fist-sized device containing two ceramic parts. Made by Clevite Corp., Cleveland, it converts a single short motion to a 20,000-volt charge.

Gold lost in electroplating is now recoverable with a special device by Technic, Inc., Providence, R. I. The precious metal is salvaged on a resin trap.

Some 300-billion gallons of water are used in the U. S. each day, according to Water Information Center, Inc., Albertson, N.Y. This compares to 160-billion gallons in 1950. By 1980 the total is expected to reach 600-billion.

Hydrocarbon fuel rather than calcium carbide is the source for acetylene at the Army Engineer Research and Development Laboratories, Ft. Belvoir, Va. The process involves thermal cracking of the fuel to produce a raw gas that's 15% acetylene.

Color-motion picture film for use in hi-speed cameras with exposures as short as 1/50,000 of a second has been deevloped by Eastman Kodak Co., Rochester, N.Y.

An on-and-off magnetic compound has been discovered by scientists at Du Pont Co., Wilmington, Del. The brittle manganese compound will become magnetic as the temperature rises above a point predetermined by its chemical composition. If the temperature drops, it becomes non-magnetic.

Computers converse by telephone —in computerese, that is—with an IBM Corp. (Los Angeles) device. It permits the transfer of data from one computer station to another by telephone circuit.

A robot that will read scripts, recognize people and faces, write, and even talk is being built at the University of London, England. No English accent, though. It will talk with a squeak.

One-stop information centers

Are your bulletin boards about as exciting as a lame fourth-string halfback in the Rose Bowl? If so, you might have better results with this do-it-yourself employee information center used at Boeing Airplane Company, Seattle, Wash.

These W-shaped boards are placed in areas such as cafeterias and bus stops, where employees are looking for diversion for a minute or two. They are not put in work areas. This attracts employee attention without wasting production time.

The left side of the board is the biggest attention-getter. It contains a map of the surrounding area zoned off. If a worker wants to join a car pool, he writes out a note and places it in the slot below the map, corresponding to the zone where he lives.

The panel also contains a swap-and-shop service. This consists of a rack with 70 slots, each labeled with an item that employees might want to buy, sell, or swap. A worker fills out a form with his phone number and leaves it in the slot.

These services directly benefit the company—the way a hosiery sale helps a department store. It attracts the worker to the board. Once there, he'll look at the other items, such as suggestion system publicity and company announcements.

White-collar thieves

Most large plants keep a fairly sharp lookout against theft by hourly workers. But compared to dishonest executives and supervisors, the blue-collar thief is a piker.

Of the $60-million in losses uncovered last year by Norman Jaspan Associates, Inc., New York, 62% was traceable to men in supervisory positions. A large percentage of the total took the form of inventory manipulations that distorted financial statements, according to the investigating company.

Nearly a half-billion dollars is stolen from American business each year. Another $5-billion is handed out annually in the form of kickbacks, bribes, and favors.

Machine memorizes mill measurements

This jig boring and milling machine with a memory has slashed production time at Timken Roller Bearing Company's Columbus, Ohio, plant. With it, 40 machine positions can be stored and automatically repeated to 1/50,000 of an inch accuracy.

When the operator has an item with a number of identical holes to be drilled, he only has to measure once. As he drills the first hole, the memory device records the specific drilling data. After that, it's only a matter of pushing a button. Production time savings range between 8% and 20%.

The machine is made by Société Genevoise, Geneva, Switzerland.

Pinball machine lights up the count

Manual winding of core matrix assemblies is a tedious job and it's all too easy for the worker to lose track of what he's doing. This complicated-looking gizmo to your right solved the problem at International Business Machines Corporation (Poughkeepsie, N. Y.). It keeps track of each step the employee is working on and points out the next operation.

The matrix is connected to the programer by a holding device. Each time the operator passes a wire through a point she turns the matrix around 180 degrees. This activates a switch that moves the counter up one and lights up the instruction for the next move. In the photo for example, the counter (the first two rows of the programer) is lit on step one. The other light indicates that the operator should thread the wire from point one to point 17. There's no need to go back to the instruction book whenever you suffer a lapse in memory.

MERRY-GO-ROUND JIGS GET THE BRASS RING

Use of these two circular jigs has cut production time, saved valuable production space, and increased quality of product at Sierra Electronic Corporation's Menlo Park, Calif., plant.

Left photo shows a circuit board jig that can handle 25 subassemblies, up to 15 inches in length. The jig rotates freely, as the operator performs one series of operations clear around it. There's no trouble handling boards of varying sizes—you simply adjust the sliding clip.

A conventional camera tripod head (right photo) gives the assembler access to any part of these shafted subassemblies. She only has to tilt the tripod. Like the board holder, this jig also rotates freely.

Safety police look behind accidents

Most industrial plants have some sort of safety committee checking on potential accident hazards. All too often, however, the very act that causes an accident is completely overlooked. Bassick Company, Bridgeport, Conn., believes that the elimination of an unsafe act is at least 60% more effective in reducing accidents than the elimination of an unsafe condition.

In line with this thinking, the company set up an Accident Incident Division Staff. Made up of rotating members, its job is to examine the actual incident that led to an accident. It then evaluates the remedy proposed by the supervisor and institutes corrective action.

As a group, the A.I.D.S. is not responsible for the detection and elimination of unsafe conditions, but as individuals this is a normal part of their duties.

COMING NEXT MONTH

When automation or slowdown forces you to cut back labor, how do you solve the human problem? Lockheed helps its workers find other jobs before it removes them from the company payroll.

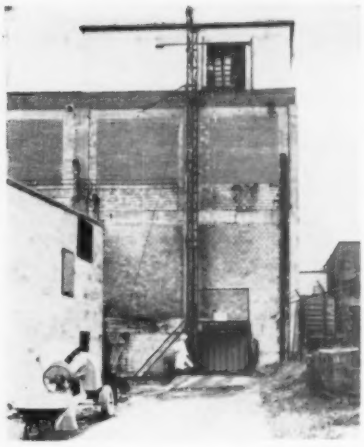
Tell 'em and show 'em

Here's a way to give your engineering conferences another dimension. This overhead projector illustrates material, diagrams, or charts in clear, enlarged form at Bell Telephone Company's Minneapolis branch. If the speaker wants to emphasize a figure, he just picks up a pencil and points.

There's no time wasted making these transparencies. It only takes a few seconds to make positive, negative, or colored transparencies out of any printed, typed, written, or drawn material. You just run it through a dry copying machine (Minnesota Mining and Manufacturing Company, Minneapolis).

The speaker can even write on the chart with a grease pencil while he's talking. The plastic sheet can be wiped clean with a cloth.

Cost: 13 to 16 cents transparency, depending on quality.



Outside elevator breaks bottleneck

No room in your plant to build a much-needed additional freight elevator? Then build it outside.

The bottleneck caused by congestion of overworked freight elevators was eliminated by this outside lift at Marhoefer Packing Company, Inc., Muncie, Ind.

The elevator (Buck Equipment Company, Cincinnati) operates to a height of 40 feet at a speed of 65 fpm., with a 1-ton capacity.

Electrostatic cleaner puts an end to this

You can see what a problem Fuller-Merriam Company had with dust at its West Haven, Conn., plant. And it wasn't just a health menace. Combined with the plant's heat and humidity, the dust from the mixing room coated machines and hands with a sticky mess. Worse still, it played havoc with product quality.

Electrostatic cleaning (Minneapolis-Honeywell Regulator Company, Minneapolis) finally cleared up the mess. And no dust collectors were needed to do the job.

The company first decided to air-condition the mixing room, thereby keeping temperature and humidity within closely controlled limits. But this meant the resin dust would be carried through the air-conditioning system into the coils and would literally gum up the works. Mechanical filters proved unsatisfactory because of the minute size of some of the resin particles.

The answer lay in electrostatically cleaning the air before air conditioning. Incoming air now passes through a 13,000-volt electrostatic unit where dust particles are positively charged. These particles are attracted to a negatively charged collector plate. An adhesive coding on the plate further helps to hold the dust.

Some 90 to 95% of the inside air in the mixing room is recirculated with the electronic air-cleaning system. This eliminates the need for vast quantities of outside air, thus cutting cooling costs.

The system has also cut heating costs in cold weather. Since the air has already been heated to the desired temperature, only a small amount of extra heating is needed. This takes an 18,000-Btu. furnace instead of a 480,000-Btu. unit.

Lie detector weeds out misfits

Delving into backgrounds of your prospective employees can be an expensive proposition at best. General Plant Protection Corporation, Los Angeles, has cut this cost in half by means of a polygraph examiner —a lie detector. (The company supplies guards to both industry and the government.) The new system has also considerably reduced employee turnover at G.P.P.

Don't pooh-pooh this method. It's more accurate than might appear at first glance.

G.P.P. reports that 7% of prospective employees have been found unfit on the basis of the lie-detector tests. Most of these would have been hired with a routine background check. What's more important, no government agency has denied clearance to any employee that has passed a polygraph test.

It's virtually impossible to beat the lie detector, according to G.P.P. Only a pathological liar can do it, but if he does, he will be categorized as such on the test. This will result, of course, in his immediate rejection for employment.

The detector probes these background areas:

- Former work record.
- Subversive activity data.
- Prior arrests, including those for traffic violations.
- Military service.
- Health information.
- Marital status.
- Credit.
- Use of liquor and narcotics.
- Homosexuality.
- References.
- Character.

YOU BE THE ARBITRATOR

(Continued from page 236)

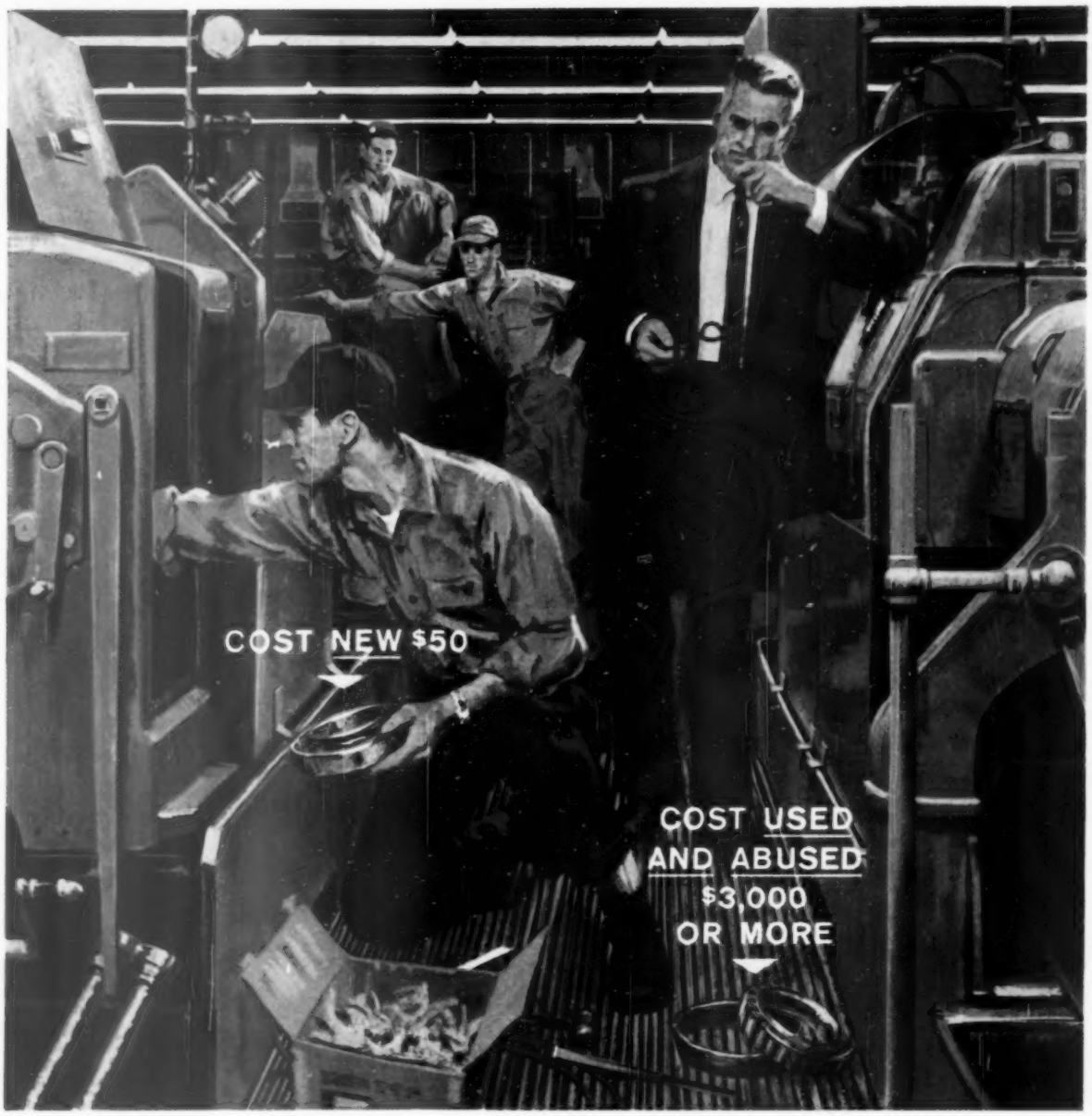
The award—The decision backed the union's position. The arbitrator made three points:

1. When a man leaves a job, there is a presumption that a vacancy exists. As long as management expects that someone will have to do the work—even if only part-time—the vacancy does exist.

2. The provision for employees to bid into a vacant job on a seniority basis is a valuable contractual right. It would be unfair to deprive them of such opportunity, particularly as the union may have given up other demands for it.

3. The fact that men in higher grades may have to be laid off if not permitted to do the work is immaterial. The contract provides for layoff based on seniority when necessary.

Caution: The award in this case is not an indication of how other arbitrators might rule in apparently similar cases. Arbitrators do not follow precedents. Each case is decided on the basis of the particular history, contract, testimony and other facts involved.



That real cost figure tells him why lubrication is a management responsibility

When a bearing fails, a new one will cost, say, $50. But if that failed bearing shuts down your entire production line, the resulting downtime and lost production can run the bill up to $3,000 or more. And that's your *real* replacement cost.

Only management can effect a cure for this severe bite out of profits. Here's why:

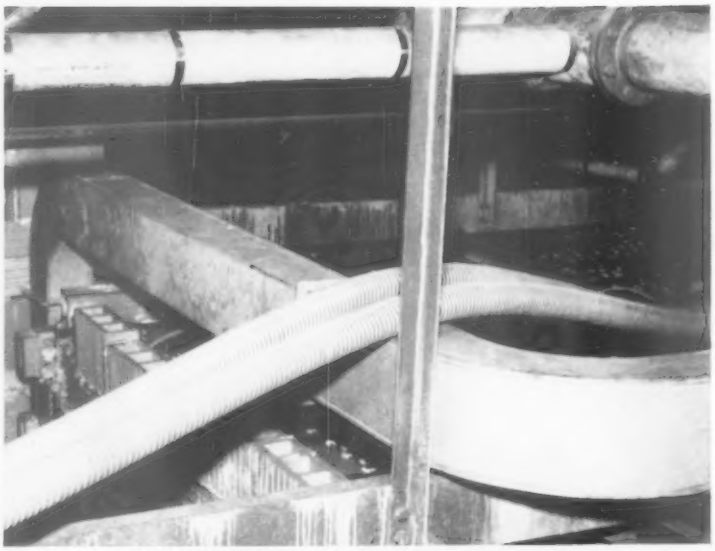
A failed part is only a symptom; very often the *cause* is improper lubrication. The part can be replaced but the cause remains. The machine will fail again.

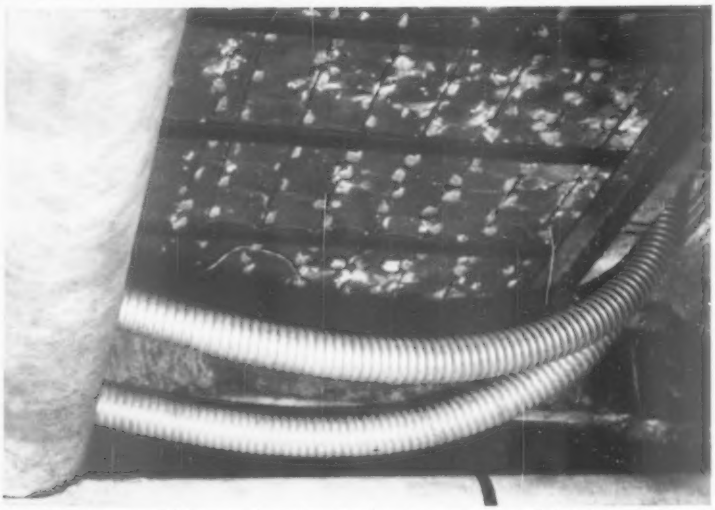
Like any plant-wide operation procedure, an organized lubrication system—which will prevent the vast majority of equipment failures—has to come from the top. For this reason, lubrication is a management responsibility.

For a preview of what Organized Lubrication can accomplish in your plant, we invite you to see our new movie "Stop Loss with Organized Lubrication." For an early showing, write:

Texaco Inc., 135 East 42nd Street, New York, N.Y., Dept. F-170.

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL





For air conditioning: Three conductor, 500 Mcm, 37 wire, 9/64" varnished-cambric insulated Anaconda Duralox Cable was quickly, easily installed in older building to handle new load. Cable runs from breaker box in west wing (left) through loft of roof (top right) to side wall building and down wall (bottom right) to breaker box on lower floors.

PROBLEM: Installing new circuits in old building
SOLUTION: Duralox Interlocked-armor Cable

or: *How to do a hard job the easy (and low-cost) way*

Installing new circuits in an old building—whether for air conditioning, as the case here, or for new machinery or new load centers—can be tough and costly. You either have to go around existing obstructions, a laborious job with rigid conduit, or remove them.

The ideal solution is Anaconda Duralox Interlocked-armor Cable.

Because it is flexible, Duralox Cable is quick, economical to install—indoors or out—with simple supporting devices. It trains easily around corners, columns and other obstructions in *long, unbroken runs.* Circuits are easy to relocate . . . always accessible. Duralox's interlocked metal-tape armor affords excellent protection against mechanical damage.

Anaconda Interlocked-armor Cable is available in sizes No. 6 Awg to 750 Mcm—copper or aluminum conductors—up to 15 Kv. Underwriters' approved for 600 volts and 5000 volts. With rubber, plastic, or varnished-cambric insulation.

BULLETIN DM 5606 on Anaconda Duralox Cable gives you full information. Write for your copy today. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

61263

ASK THE MAN FROM **ANACONDA**®

FOR **INTERLOCKED-ARMOR CABLE**

FACTORY MATERIALS NEWS

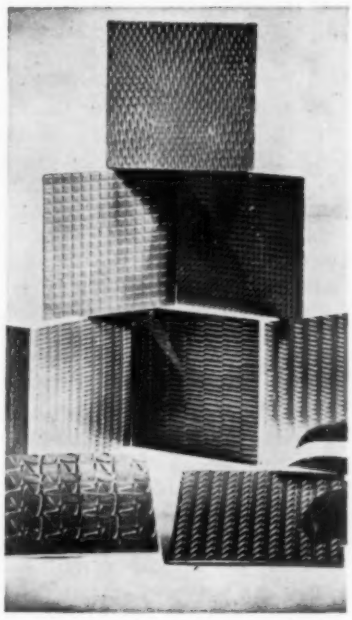
For more about these items, circle numbers on Reader Service Card next to back cover.

New patterns in textured steel

Thirty-six stock patterns are offered in this new series of textured steels called Sharonart. The manufacturer also has a custom design service available to customers who want to develop new patterns to meet their specialized needs.

Ease of fabrication is stressed; the same equipment used to form flat-rolled steel can be used without interchange of parts to form textured steel. And the material can be formed without deformation of the texturing.

Material is expected to have wide application in the fabrication of small appliances, metal furniture, hardware electronic equipment. Can also be used as curtain-wall sections. *Sharon Steel Corp.* (Circle 195)



196—Machining and grinding concentrate is a fortifying agent for cutting, grinding, tapping, and drawing oils. Contains extreme pressure agents and thermal filler. Dilution is one part concentrate with 10 parts of 90-150 second pale oil. *Baker/Gubbins Co.*

197—Die steel is used for punches and tooling for abrasive products. Air or oil hardening, high-chromium, 1½% carbon. Rated "best" for non-deforming properties, safety in hardening, and abrasion resistance. *Darwin and Milner, Inc.*

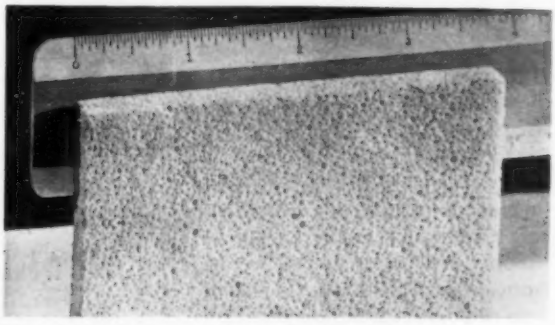
198—Silicone resin paper, suitable for operation at temperatures over 180 C., is available in gauges from 0.0025 to 0.0065 in. Weighs 26 lb. per 100 sq. yd. Tear strength is 100 grams with the grain and 350 grams across. *Raybestos-Manhattan, Inc.*

A pair of high-temperature insulating materials

Panels do a three-way job

Suspended acoustical ceiling panels provide rated fire protection plus the advantages of sound absorption and dry installation. Panels are 2x4 ft., and carry a three-hour beam protection rating by Underwriters' Laboratories, Inc. They are able to withstand exposure to direct flame and 2000 F. temperatures, have a noise reduction coefficient of .75.

The panels are attached to an exposed grid suspension specially designed to withstand the intense heat of a fire, and can be lifted out any time for access to plumbing line, air conditioning ducts, etc. Ceiling needs no additional fireproofing above it. *Armstrong Cork Co.* (Circle 199)



Brick made of zirconium oxide

Ceramic insulating brick withstands temperatures to 4200 F., comes in a standard 2½x4½x9-in. size. Made of a zirconium oxide material that has been expanded and fired, the brick has a very low thermal conductivity at high temperatures. It has an 89% porosity and weighs about two lb. per brick.

A cellular structure consisting of uniform open pores with all cells interconnected permits gas to pass through for purging or evacuation. This porosity also permits the passage of liquid. Temperature limit is 4200 F. in oxidizing atmosphere or vacuum, slightly less under other conditions. *Ipsen Industries, Inc.* (Circle 200)

Turn the page

"Time Study Tom"

HE WORKS FOR PEANUTS

Can Save You Thousands

His real name is "SERVIS RECORDER"— an instrument that keeps track of what machines or lift trucks are doing 24 hours a day. Every stop and every start are permanently recorded. You get an exact record of total productive time and non-productive time of any machine. Now you can pin-point inefficiency quickly — and the cost is peanuts!

Mechanical Models attach to machine.

Electrical Models may be placed in plant office.

Write for folder.

THE SERVICE RECORDER COMPANY

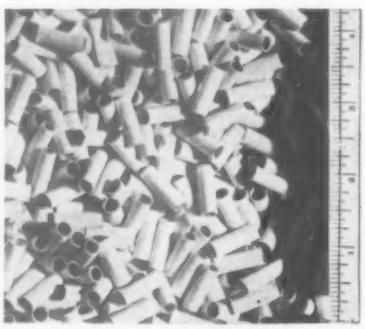
1013C ROCKWELL AVE. • CLEVELAND 14, OHIO

For more about these items, circle numbers on Reader Service Card next to back cover.

201—Steel pipe and tubing combat corrosion and iron contamination, is 98% nickel, 2% phosphorus. Metallurgical bond permits 360-deg. coiling with no peeling. Capacity to withstand temperatures to 1000 F. and pressures specified for base steel. *M. L. Sheldon & Co.*

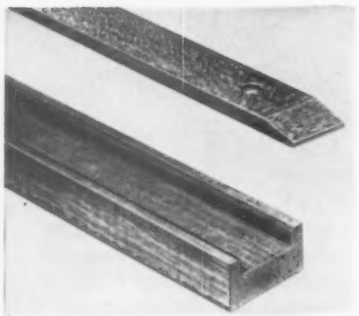
202—Metal forming lubricant is supplied as a dry white powder (eutectoid), but when mixed with water it forms a viscous liquid that adheres to metal surfaces. For use at temperatures between 1100 and 2200 F. It's non-toxic. *Alpha-Molykote Corp.*

203—Plastic cleaner & polish dries quickly and produces a glossy surface that resists body impressions, finger prints, scuffing, etc. It dries quickly, is non-oily, and is not a wax. It is applied by using a small amount on a clean cloth. *Acorn Paint & Chemical Co.*



204—Packing material consists of hollow, resilient, cylindrical paper tubes ¾-in. by ¼-in. in diameter. It's poured to surround an object in a container, is clean, odorless, reusable. Resinous coating prevents shifting of packed items during shipping. *Safe-T Flo-Pak.*

205—Plastic packaging resists shock, acid, mold, water and contamination. Lightweight polystyrene foam plastic can be used for industrial and proprietary packaging, displays, flotation, and insulation. Easy molding permits freedom of design. *General Box Co.*



206—Wear strip of self-lubricating wood is for use on conveying machinery, comes in many lengths and thicknesses. Easily machined to conform with mounting specifications. Resists jamming caused by bottle breakage, can damage, and similar mishaps. *Paramount Oilless Bearing Co., Inc.*

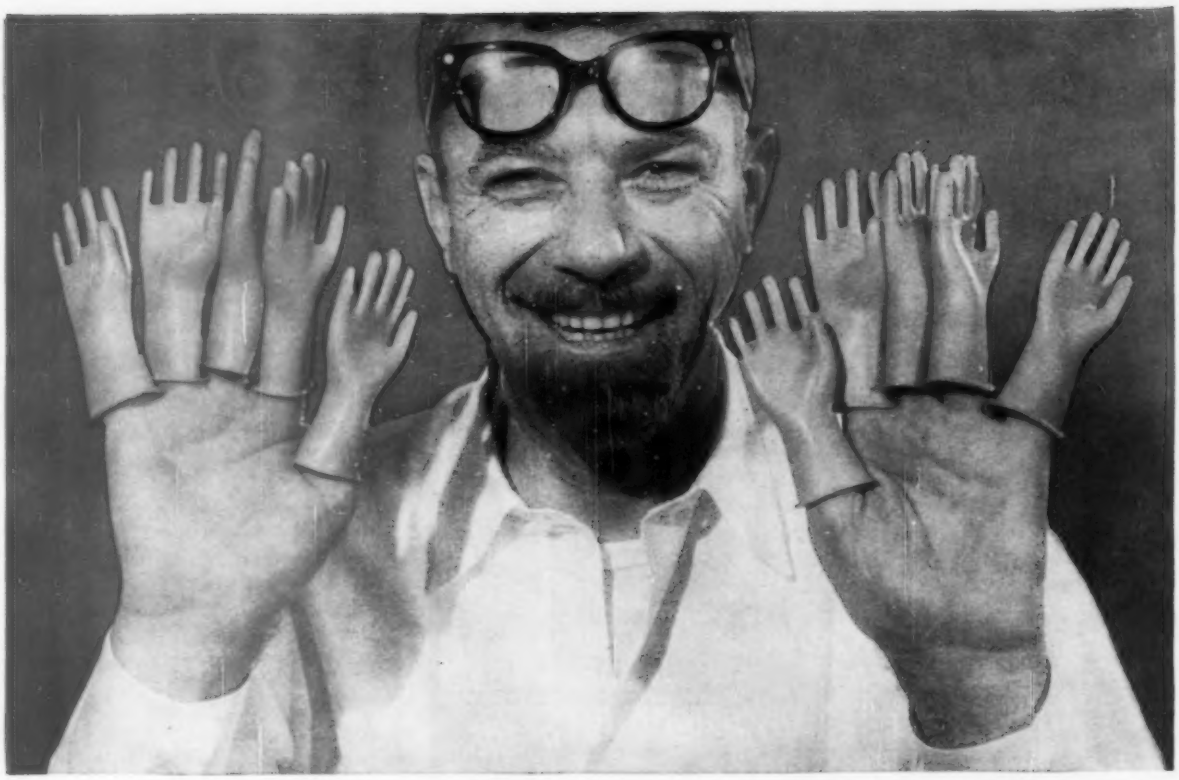
207—16mm Film has been modified for use in high-speed work where image clarity must be achieved under adverse lighting conditions. ASA 250/200. All of the new spoolings incorporate an integral leader and trailer for loading in subdued light. *Eastman Kodak Co.*

208—Steel canopies are coated with aluminum or zinc to reflect the sun's rays and resist corrosion. Used for car ports, covered walkways, equipment and maintenance sheds, loading platforms, etc. Delivered ready for erection. *Armco Drainage & Metal Products, Inc.*

209—Gummed tape is designed for cartons to be opened by hand and re-used. It is non-asphaltic glass-fiber reinforced, and uses a two-layer tape closure method: a layer of reinforced construction on top and a thin kraft layer underneath. *Minnesota Mining & Mfg. Co.*

210—Industrial fabrics will support 500 to 600 times their own weight. Highly fire-resistant, waterproof, oil- and acid-resistant, and workable. They come in 8- and 10-oz. vinyl-nylon, and 8-oz. vinyl-Dacron fabrics. Available in a variety of colors. *Toscony, Inc.*

Turn the page



Ten-count 'em

ten quality lines...one dependable source...

INDUSTRIAL GLOVES

Poly-D
Natural Rubber
Soft-Lined Latex
Unlined Latex
Soft-Lined Black Neoprene
Unlined Black Neoprene
Unlined White Neoprene
Buna-N
Compar Plastic

LINEMEN'S GLOVES

Natural Rubber
(Leather Protectors, too)

Don't shop around for gloves! Now—from ONE dependable source—you can get the gloves you need for better hand protection in hundreds of industrial chemicals. Thanks to premium-quality materials and advanced design, Wil-Gard Gloves provide longer wear and greater comfort . . . give you more value for your glove dollar.

POLY-D® Disposable Gloves—Newest addition to the Wil-Gard line. Clear, flexible Polyethylene. Convenient, economical protection from many chemicals, powders and resins.

See your Wil-Gard Distributor for more information

WR-1159-19

PROTECTION FOR THE HANDS OF INDUSTRY • SINCE 1916

WIL-GARD®

THE WILSON RUBBER COMPANY INDUSTRIAL DIVISION CANTON 6, OHIO

A Division of Becton, Dickinson and Company • Pacific Coast Warehouse: 530 Howard St., San Francisco 5, California

POST ELECTRONIC PRODUCTS

Keeps tabs on hourly production and count . . . too!

MODEL P2 RM

The Post P2 RM is a preset electronic counter which **also indicates hourly production rate** on a two-scale rate meter. By using this dependable component in conjunction with sheet fed machines, conveyor lines, small parts manufacturing, etc., you have the benefit of "batch" counting desired quantities. At the same time you'll be able to keep tabs on your production flow. A visual totalizer indicates unit or total batch counts.

For complete details write: Decitron

POST ELECTRONIC PRODUCTS

Division of Reid Brothers Company, Inc.

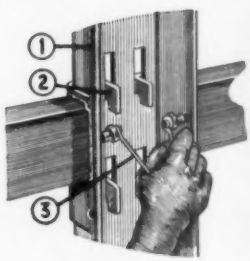
12 LOTHROP ST. / BEVERLY, MASS.

For more facts Circle 547 on Reader Service Card

Ridg-U-rak®

PATENTS PENDING

FASTEST WAY TO CONVERT AIR SPACE INTO EFFICIENT STORAGE SPACE



Every Ridg-U-rak Connection Locked 3 Ways

(1) Full length external column flange stops *side* movement

(2) Double engaging hooks in slots stop *down* movement

(3) Spring Steel Pinch Pins stop *vertical* movement

Plant Engineers will appreciate the adaptability and sturdiness of Ridg-U-rak storage systems—the simplicity that speeds erection or disassembly—the ease of Beam adjustment. The Ridg-U-rak patented connection is a big advance over BG's pioneering double hook and slot design. Only two basic parts, the Upright Frame with its external column flanges and the Beam with its integral double hook pads are engineered into Ridg-U-rak Systems to meet storage needs.

For a description of Ridg-U-raks, write for Catalog 107—A

BERNARD GLOEKLER NORTH EAST CO.

NORTH EAST, PA.

For more facts Circle 548 on Reader Service Card

For more about these items, circle item numbers on Reader Service Card next to back cover.

MATERIALS LITERATURE

211—High-temperature alloys, both cast and wrought, are covered in this 20-pager. Physical, mechanical, and chemical properties of company's full line are presented in easy-to-read tables and bar charts. *Haynes Stellite Co.*

212—Coated abrasives for metal working are discussed in 20-page booklet that has tables, photos, recommended operating practices. Abrasive forms covered: belts, disks, sheets, rolls, wheels, and specialty items. *Minnesota Mining & Mfg. Co.*

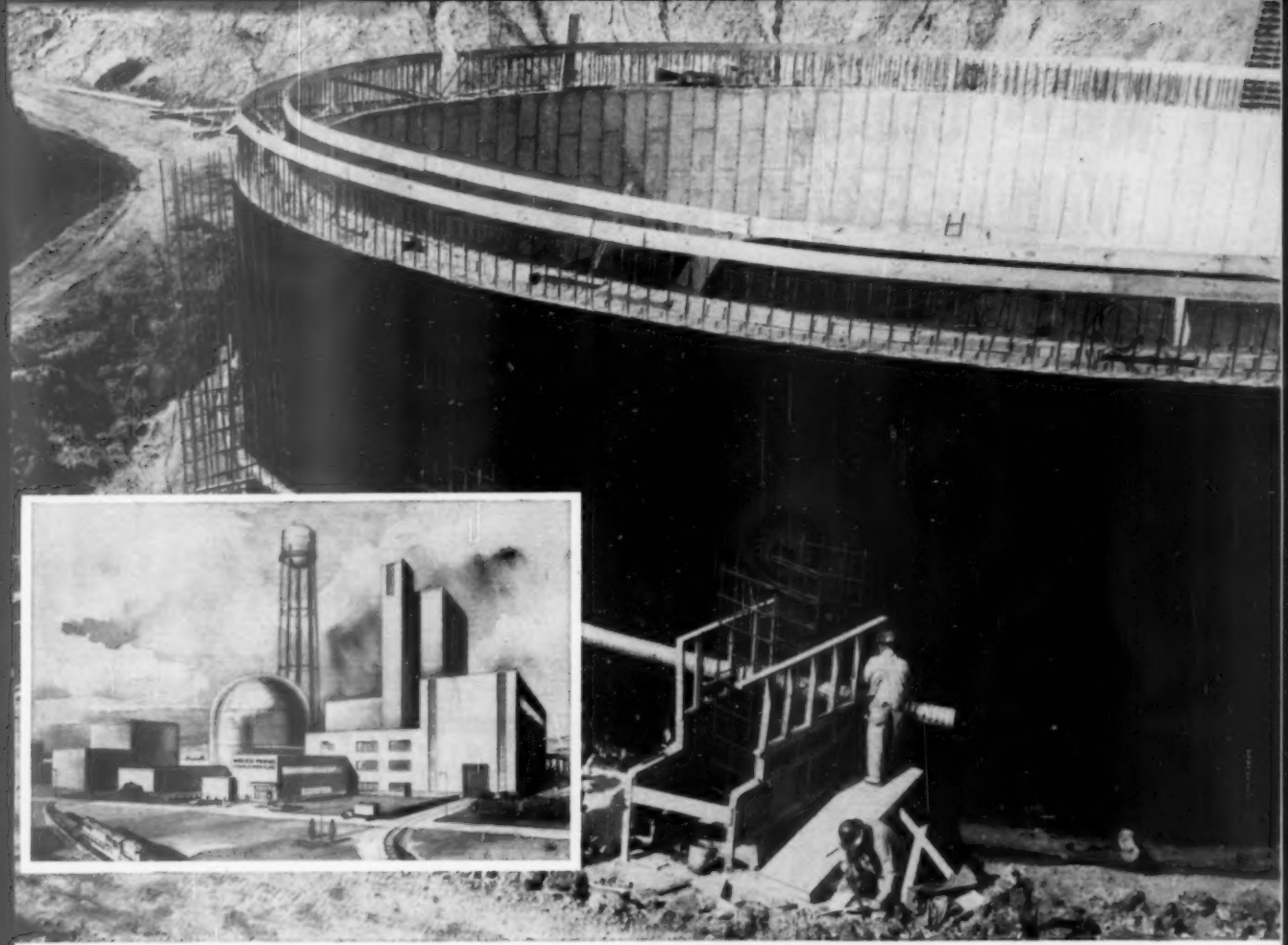
213—Glasteel, which features a combination physical-chemical bond between glass and steel, is described and illustrated in this 20-page booklet that has photos, extensive technical information, several charts. *The Pfaudler Co.*

214—Steel floorplate, called USS Multigrip, is covered in this 16-page booklet (ADUCO-17002-59) that has tables of weights and dimensions, allowable loads for various thicknesses and spans. *U. S. Steel Co.*

215—Nitriding processes are described briefly but effectively in Bulletin TM-1 (14 pages). Includes a history of the process, information on equipment and techniques, technical data in tabular form. *Armour Industrial Chemical Co.*

216—Urethane foams, their development, uses, properties, performance, and basic chemistry, are covered in this 24-page brochure. Sections on foam for packaging, acoustical and low-temperature insulation uses. *Mobay Chemical Co.*

217—Protective coatings based on tar products are presented in the 8-page booklet (T-97-61). Coatings are designed to meet problems such as underground corrosion, water exposure, corrosive atmospheres, and the like. *Koppers Co., Inc.*



Bitumastic No. 50 waterproofs and protects concrete foundations at atomic power plant

When actual construction was begun in 1956 on the nation's largest "breeder type" atomic reactor and generating station—the 100,000-kw Enrico Fermi Atomic Power Plant—Bitumastic® No. 50 was called for in the plans for most below-grade concrete surfaces.

Nearly 40% of the 915-acre atomic power plant site at Monroe, Michigan, was originally marsh land or entirely submerged before a gigantic filling operation was undertaken. This subsurface condition made damp-proofing of reinforced concrete foundations—particularly of the reactor building, shown under construction, above—an important design consideration. Bitumastic No. 50, well-known for its resistance to water penetration, was applied in two coatings to all concrete foundations.

Bitumastic coatings have been performance-proven on many industrial installations where protection against water absorption, salts and industrial contamination which cause corrosion are essential. There is a Bitumastic coal-tar based coating for every industrial coating application. For more information on how the Bitumastic coating systems can benefit you, mail the coupon or write: Koppers Company, Inc., Tar Products Division, Pittsburgh 19, Pa. District Offices: Boston, Chicago, Los Angeles, Pittsburgh, New York and Woodward, Ala. In Canada: Koppers Products, Ltd., Toronto, Ontario.

For more facts Circle 549 on Reader Service Card

SEE OUR CATALOG IN SWEET'S

KOPPERS

KOPPERS
BITUMASTIC
COATINGS & ENAMELS
another fine product of COAL TAR

Koppers Company, Inc., Tar Products Division
Dept. 135A, Pittsburgh 19, Pa.

Gentlemen:
Yes, I'd like to know more about Bitumastic Coatings for Corrosion Prevention.

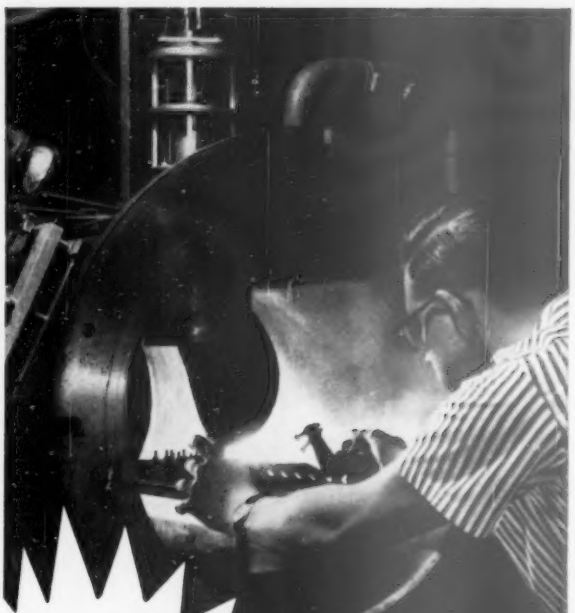
Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____

NEW Complete... Welding Facilities



FOR TOUGH WELDING PROBLEMS

Rosemount Engineering Company announces the installation of a 36" chamber Electron Beam Welder in its Welding Department. REC's certified welding facilities include:

- Electron Beam Welding—from .003" foil to .500" plate —including exotic metals such as beryllium, molybdenum, tungsten and zirconium
- Tungsten Inert Gas Welding
- Metal Inert Gas Welding
- Aircomatic Gun—permits rapid deposits of wire for distortion control
- Stake Seamer—for controlled arc penetration and accurate positioning of parts

WELDING SERVICE AVAILABLE—REC's welding engineers provide consultation and establish welding procedures for difficult problems on an R and D basis. REC's welding facilities are available for production work on an hourly or piece basis. Write, wire or call if we can be of service on jobs requiring broad R and D or production experience.

REC

ROSEMOUNT ENGINEERING COMPANY

4900 West 78th Street • Minneapolis 24, Minnesota

248 **For more facts Circle 550 on Reader Service Card**

REMOVE COILS FROM PALLETS QUICKLY & EASILY

- Safe
- Labor-Saving
- Efficient
- Won't Damage Material!
- Self-Contained
- Automatic
- Portable

Sizes to handle loads from 3,000 to 40,000 pounds. Prices start at $2000.

Fork truck sets palletized coils on bed of cradle.

Cradle tips backward as base rotates.

Cradle nears end of 90° backward tip as it is finishing its 180° rotation.

Coils, now off pallet, face truck and are ready to fork.

turnover cradle

A Product of LA DEAU MANUFACTURING COMPANY
2702 San Fernando Road, Los Angeles 65, California
Telephone CApitol 2-8108

For more facts Circle 551 on Reader Service Card

PRESTIGE PRODUCTS
Since 1906
NEW! Wall-Hung Waste Receptacle
Attached easily to the wall, it cannot be pushed around or knocked over. Access to liner by key only — no scattering of contents by vandals or mischief-makers. Removal of liner is easy — just open hinged door and slide out. Valuable in areas where floor space is limited.
WASTE RECEPTACLES

WRITE FOR FREE CATALOG

BENNETT

MANUFACTURING CO., INC.
DEPT. 58 ALDEN, N. Y.

Also makers of the original step-on receiver . . .

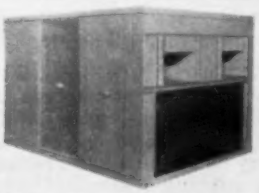
TRADE MARK SANI-CAN PATENTED

For more facts Circle 552 on Reader Service Card

four industrial tycoons

who installed Typhoon air conditioning

THE SLAVE DRIVER: Since public relations came in, whips are out, so he gets increased production through Typhoon industrial air conditioning. It reduces absenteeism and errors, too, as proven by many private and U.S. Government surveys.
THE SCHEMER: Because Typhoon air conditioning increases efficiency and production, his manufacturing costs are lower. He can undersell competitors, or take a bigger profit. He also gets tax benefits from Typhoon's financing and leasing plans.
THE SKINFLINT: He selected Typhoon because it offers outstanding economies—the greatest savings in space and cost. Its quality components assure lowest operating and maintenance expenses. And Typhoon delivers the broadest choice of units in the field, flexibly designed and customized to suit any need at little or no extra cost.
THE EGGHEAD: Before he ordered, he used Typhoon's simple formula for calculating the exact amount of increased production he would require to offset the cost of air conditioning. It came to 2%—a quota he'll easily make and then some. Whatever your reasons for considering industrial air conditioning, you should investigate the vast benefits that are exclusively offered by Typhoon. Survey findings, Typhoon's cost calculating formula and engineering data are yours, free. Contact your Typhoon dealer or mail coupon today.



Air Cooled Self-Contained Units 3 to 30 Tons

TYPHOON
HUPP

TYPHOON AIR CONDITIONING DIVISION, HUPP CORPORATION 11-1-1
505 Carroll Street, Brooklyn 15, New York

☐ Please send me full product literature on Typhoon's 1961 Line.
☐ Please have a representative call for an appointment.

NAME_____
FIRM_____
ADDRESS_____
CITY_____ ZONE_____ STATE_____

Air or water cooled units; ceiling, floor or roof-mounted units; units that heat and cool or cool only—in capacities from 3 to 75 tons.

How To Save Thousands of Dollars Addressing Multiple Shipments

IF *you regularly address 5 or more cartons per shipment,* you may be throwing dollars out the window using antiquated, repetitive addressing methods. Not only are they time-consuming but they are frequently the cause of errors and mis-shipments.

With a modern STEN-C-LABL* System tailored to your addressing needs, you can save two ways:

1 *As a by-product of your office procedure.* Your present method of preparing your invoices, orders, bills of lading or shipping papers can also prepare STEN-C-LABLS *at the same time.* Whether you use manual or electric typewriters, electric billing or accounting machines, slave machines or various magnetic tape and punched IDP systems, there's a STEN-C-LABL to fit your requirements.

2 *By making unlimited impressions direct to cartons, labels or tags.* With handy squeeze-feed applicator, shipping department makes unlimited impressions direct to PANL-LABL printed on carton at no extra Cost. Also addresses gummed labels and tags. Addressing is fast, neat, legible. Laborious, repetitive procedures are eliminated, preventing errors and mis-shipments.

A STEN-C-LABL address is durably marked and plainly legible at handling distance—becomes a permanent part of carton because it is sunproof and waterproof.

Thousands of present users are saving $5,000 every year with STEN-C-LABLS—some as much as $15,000. And they have eliminated a bottleneck in their shipping department that previously caused loss of good will and customer patience even more damaging to profits but less measurable.

FREE BROCHURE shows how easy it is to make these important savings in your operation. Write for it today.

STEN-C-LABL, Inc.

F-1, 1821 University Ave., St. Paul 4, Minnesota

*Registered U.S. Pat. Off. The term STEN-C-LABL is the trademark and exclusive property of STEN-C-LABL, Inc. All STEN-C-LABLS are manufactured by STEN-C-LABL, Inc., St. Paul, Minnesota, under U.S. Patent No. 2,771,026. Other patents pending. Also available in Canada.

ADVERTISERS' LITERATURE

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

BUILDING

275—Plant sites. New booklet, "Louisiana Invests in Industry," plus other details. Louisiana Dept. of Commerce.

276—Floor grating. This new catalog describes safety features of fireproof Grip-Strut grating. The Globe Co.

277—Plastic panels. Full details on both Stylux-20 and your unusual 20-year guarantee. Butler Mfg. Co.

278—Dust control systems. Write for 52-page catalog or no-obligation survey of your problem. Kirk & Blum Mfg. Co.

279—Floor grating. Easy-to-use steel grating booklet gives complete facts, applications. Kerrigan Iron Works Co.

280—Open benches. Catalog lists lengths, widths, tops, heights, and accessories. Columbia-Hallowell Div., SPS.

281—Smokestacks. Bulletin contains all the facts on stacks glass-protected inside and out. A. O. Smith Corp.

PACKAGING, SHIPPING

282—Stencil duplicator. This illustrated new how-to (and why) book is free—gives many facts. The Multistamp Co.

283—Scales. Here's information on full line of weighing equipment from 1/100 oz. to 100 tons. Detecto Scales, Inc.

284—Stencil labels. This brochure shows how to incorporate them into present addressing methods. Sten-C-Labl, Inc.

PLANT SERVICES

285—Exhauster fans. Catalog 707 contains performance tables, dimensions, and system data. Clarage Fan Co.

286—Flexible connectors. Write for data on standard all-metal stainless steel connectors. Universal Metal Hose Co.

287—Unions, fittings. Descriptive brochure on Dart unions and fittings is free on request. The Fairbanks Co.

288—Water coolers. Latest catalog lists complete line of wall-mounted and floor coolers. The Halsey W. Taylor Co.

289—Dust collector. Here's literature on automatic continuously cycling collector with useful features. Torit Mfg. Co.

290—Compressors. Current catalog has descriptive data on high-pressure air and gas types. Norwalk Co., Inc.

291—Waste receptacles. Full information on new wall-hung model in this free catalog. Bennett Mfg. Co., Inc.

292—Fans. Bulletin A-1103 gives technical data, mechanical features of Airfoil bladed fans. American-Standard.

293—Couplings. Catalog has 62 pages that contain information on all sizes and types. Snap-Tite, Inc.

MATERIAL HANDLING

294—Overhead conveyors. Catalog CD-B tells about Cable-Way overhead conveyor, attachments. American Monorail Co.

295—Plastic containers. This brochure has information on one-piece molded plastic containers. G. B. Lewis Co.

296—Monorail, crane. Booklet (52 pages) illustrates applications of interplant transport system. Louden Machinery Co.

297—Hoists. Catalog lists line of hand, electric chain, or wire rope hoists, pullers. Chisholm-Moore Hoist Div.

298—Tractor-shovel. Here's data on no-spill buckets with three models of rubber-tired shovels. Frank G. Hough Co.

299—Lift trucks. Catalog covers F-40 series featuring more power with less fuel. Allis-Chalmers Mfg. Co.

300—Lift trucks. Latest catalog, "Narrow Aisle Handling Equipment" contains many useful ideas. The Raymond Corp.

301—Conveyor belt. Write for "Conveyor Belt Selector" to help you pick belts for various uses. B. F. Goodrich Co.

302—Electric hoists. Catalog E-58 describes features of built-in overload protection. Wright Hoist Div.

303—Steel shelving. Brochure covers simple, adjustable, and rapidly assembled line. Borroughs Mfg. Co.

304—Cranes. Write for bulletin on Job-Mated cranes—from 500 lb. to 500 tons. Shepard Niles Crane & Hoist Corp.

305—Batteries. Here's useful booklet, "Why We Use Battery-Electric Industrial Trucks." Gould-National Batteries, Inc.

306—Stackers. Bulletin describes narrow aisle stacker—floor or cab operated. American MonoRail Co.

307—Lift trucks. Complete catalog and price list describes all 54 standard models. Crown Controls Co., Inc.

Turn the page

Now! A low-cost way to automate labor costing–

Keysort® Data Processing

To market a product competitively – and to make a profit–requires control of labor costs and distribution. Figures must be readily available. Yet most data processing systems are either too expensive or too complicated for plant operation. Except Keysort.

Designed for economical plant control

Keysort is the only automated data processing system flexible enough to fit your company as it stands *and* as it grows. It is the one system adaptable and affordable to companies of every size. Anyone can use Keysort with only minimum training. It imposes no restrictions on plant operations, yet provides management with the full range of reports–labor costing, production control, inventory, lost time analysis, etc.

Easy to use in factory and office

Keysort cards are mechanically created and code-notched with your vital information. Classification and sorting are rapidly accomplished. Figures are automatically tabulated and summarized direct to reports–drastically reducing clerical burden. Management gets the information it needs *on time*. And at lowest cost.

Read about Keysort in action

Your nearby Royal McBee Data Processing Systems Representative will be happy to sit down with you, your plant managers and your foremen, to discuss a low-cost Keysort system tailored to your requirements. Call him, or write us at Port Chester, N. Y.–indicating the applications in which you are interested–and we will supply you with actual case histories from our files.

ROYAL McBEE *corporation*

NEW CONCEPTS IN PRACTICAL OFFICE AUTOMATION

CUT COSTS
WITH
LONGER-LASTING
PAINT PROTECTION

BRU-TECT
Chemical Resistant Epoxy
ENAMEL
NEWEST Achievement of
BRUNING PAINT
RESEARCH

- ★ Tough—wears longer!
- ★ Adheres better—all surfaces!
- ★ Resists abrasion—excellent on heavy foot-traffic areas!
- ★ Protects machinery and equipment indoors or outdoors!
- ★ "Eye-rest" colors created especially for factories!
- ★ Well-painted plants mean lower accident rates!

BRUNING

BRUNING BROTHERS, INC.
4209 East Chase St.
BALTIMORE 5, MD.
1800-1900 N.W. First Court
BOCA RATON, FLA.

Get the FACTS! Write TODAY!

BRUNING BROTHERS, INC.
INDUSTRIAL MAINTENANCE DIV.
4209 E. Chase St., Baltimore 5, Md.
Please send information on Bru-tect to:
NAME_____TITLE_____
COMPANY_____
STREET_____
CITY_____STATE_____

ADVERTISERS' LITERATURE

Begins on page 250

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

308—Steel shelving. This 100-page catalog tells complete story of entire line of products. Lyon Metal Products, Inc.

309—Tramrails. Booklet No. 2008 is packed with valuable information and is well-illustrated. Cleveland Tramrail Div.

310—Self-dumping hoppers. Literature tells how to cut handling costs by 50%. In eight sizes. Roura Iron Works, Inc.

311—Truck leveler. Here's data on hydraulically operated device—16-ft. platform, 3-ft. rise. Rotary Lift Co.

312—Trackmobile. Cartoon-type book, "Tricky the Trackmobile," describes versatile workhorse vehicle. Whiting Corp.

ELECTRICAL

313—Silicones. Literature describes use of silicones for insulation on motors, transformers. Dow Corning Corp.

314—Sealed cable. Here's a brochure with full application and engineering data. Simplex Wire & Cable Co.

315—Industrial TV. Write for copy of closed circuit TV system-planning guide; many applications. Philco Corp.

316—Adjustable speed drives. Bulletin 6806 describes low-cost compact mechanical power equipment. General Electric Co.

317—Armor cable. Booklet DM 5606 gives full data. Sizes No. 6 awg. to 750 mcm. Anaconda Wire & Cable Co.

318—Welder control. Brochure SM-277 has complete details about more than 32,000 combinations. Square D Co.

319—Electrical connectors. Bulletin B81 describes designs, sizes, other features, applications. Joy Mfg. Co.

MAINTENANCE

320—Pipe tools. New catalog lists pipe wrenches, cutters, and threaders. Toledo Pipe Threading Machine Co.

321—Machine mounts. Book on mounts —from laboratory equipment to giant presses—is free. Unisorb Div., Felters Co.

322—Hydraulic tools. Catalog No. P-9 tells how to cut costs with hydraulic Push-Puller tools. Owatonna Tool Co.

323—Visible records. Literature on mistake-proof preventive maintenance systems. Acme Visible Records, Inc.

Turn the page

"PLANT LAYOUT"

MODELS

. . . CUT ENGINEERING COST!

IT'S A FACT!

. . . Progressive Manufacturers Have Accepted The 3-D Model As A Sure Fire Tool For Getting The Job Done Faster, Better, And . . . At Less Cost!

"It makes sense to study and solve 3-dimensional problems using 3-D"

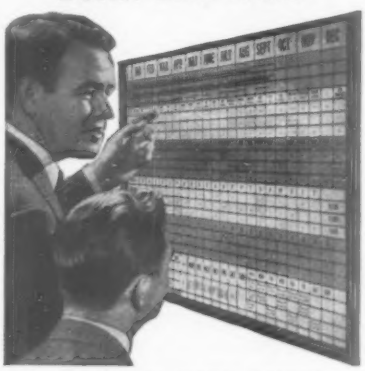
May We Assist You?

UNITED SCALE MODELS INC.

13 Wabash Ave. Pittsburgh, Pa.
201 Clayton St. Chester, Pa.

Circle 557 on Reader Service Card

How To Get Things Done Better And Faster



BOARDMASTER VISUAL CONTROL

- ☆ Gives Graphic Picture—Saves Time, Saves Money, Prevents Errors
- ☆ Simple to operate—Type or Write on Cards, Snap in Grooves
- ☆ Ideal for Production, Traffic, Inventory Scheduling, Sales, Etc.
- ☆ Made of Metal. Compact and Attractive Over 500,000 in Use

Full price $49.50 with cards

FREE 24-PAGE BOOKLET NO. X-100 Without Obligation

Write for Your Copy Today

GRAPHIC SYSTEMS
Yanceyville, North Carolina

Circle 558 on Reader Service Card

Safe, fast, profitable way to lift, carry or place any load in 5-ton range

It's Austin-Western's economical new 3-wheel hydraulic crane! This versatile Model 110 is your answer to the limitations of fork lifts and conventional 3-wheel cranes. Why? Because of its 18-ft. 7-in. telescoping boom and 220° swing. The 110 can actually outlift all other 3-wheel cranes over-the-side. Its low 8-ft. 10-in. overhead clearance and the easy maneuverability of its dual tire, rear trunnion power steering permit it to work in even the tightest quarters with ease.

Other time and money saving features include dual front driving wheels; road speeds from 2 to 18 mph. Torque converter and full hydraulic reversing mechanism are standard. The 110 can be adapted to your particular job needs with various combinations of features and equipment. And it's designed and built for easy, economical, troublefree maintenance.

Why not take a good look at this versatile new piece of materials handling equipment. Ask your Austin-Western distributor for a demonstration or write us for details.

A-W hydraulic cranes are available in 5 models; capacity ranges from 5 to 11 tons!

Austin-Western CONSTRUCTION EQUIPMENT DIVISION, AURORA, ILL.

BALDWIN · LIMA · HAMILTON

Power graders • Motor sweepers • Road rollers • Hydraulic cranes

For more facts Circle 559 on Reader Service Card

FOR SALE 154-Acre (M/L) Naval Ordnance Plant, Pocatello, Idaho

Production-ready for heavy manufacture or development as an "industrial park." Abundant power, water and local skilled work force. Overhead cranes serve every work area. More than $6,000,000 in specialized and general purpose production machinery, preserved in position for immediate operation. Two executive dwellings, lighted and paved streets, in-plant telephone system, employee cafeteria and modern automatic fire sprinkler and alarm system.

Direct service to Pacific ports and 11 Western States via Highway 30, Union Pacific, two airlines. Half a day from Yellowstone, and 90 *minutes* from mountains for year-round recreation, scenic beauty.

FREE illustrated brochure details all advantages and bid procedures. Address your inquiries to:

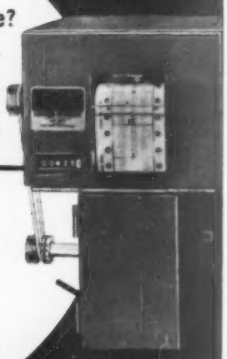
GENERAL SERVICES ADMINISTRATION
Federal Office Building • Seattle, Washington

increase production

by automatic time measurement of manual and automatic electric welding performance

how much time should a welding job take?

WELD-RECORD provides automatic, permanent (paper tape) records of productive vs. non-productive welding time.



Here's how WELD-RECORD helps YOU:

1. Accurate time-study data
2. Computing job costs
3. Reduces downtime
4. Setting job standards

EASY to install... to use... to maintain!

write for brochure to:

WELD-RECORD corporation

Dept. F-11 2105 DAWSON ROAD ALBANY, GA.

IF You Change Your Address

please be sure to let us know promptly. It takes time to correct the stencil addressing plate. And we don't want you to miss copies of FACTORY.

EASY, quick way to tell us . . . use the Reader Service Card opposite the back cover. Be sure to give us both your *old* address and your *new* address, including your postal zone number. Drop the card in the mail and we'll make the change as quickly as possible.

FACTORY
330 WEST 42ND ST.,
NEW YORK 36, N. Y.

ADVERTISERS' LITERATURE

Begins on page 250

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

324—Protective coatings. Color-horizons system catalog has 110 color standards, 69 photo applications. Rust-Oleum Corp.

325—Engineered maintenance. Booklet (16 pages) fully describes organized maintenance program. Puritan Chemical Co.

326—Signs. New 4-color catalog lists various types of ready-made safety signs and applications. Ready Made Sign Co.

327—Vacuum systems. Catalog 155B presents facts on industrial vacuum cleaning equipment. Spencer Turbine Co.

328—Oilers and cans. Booklet (free) shows complete line in all styles and sizes for every purpose. Eagle Mfg. Co.

329—Vacuum cleaners. Brochure shows nine new models of heavy-duty cleaners. Black & Decker Mfg. Co.

330—Paint. New "slide guide" contains information on selection of proper paints. Barreled Sunlight Paint Co.

331—Vacuum cleaners. "Invincible Vacuum Equipment," describes many uses. Invincible Vacuum Cleaner Mfg. Co.

332—Machinery mounts. Gives data on mounts for isolating and dampening vibration. Clark, Cutler & McDermott Co.

333—Scaffolds. Descriptive circulars on stairway, span-type, Tallescope, aluminum scaffolds. Up-Right Scaffolds.

334—Protective coatings. Bulletin P-57 has data on activated epoxy coatings. 10 colors. Wilbur & Williams Co.

335—Combination scrubber-vac. Literature covers labor-saving features, other benefits, sizes. Finnell System, Inc.

PRODUCTION

336—Riveters. Bulletin HDR-4-59 has complete data on new hydraulic dual Rivitor. The Tompkins-Johnson Co.

337—Recorders. Folder gives full information on both mechanical and electrical models. Service Recorder Co.

338—Safety containers. Catalog of fire-safe products for handling flammable liquids. Protectoseal Co.

339—Schedule board. Guide to control methods has full-scale, sample chart section. Conley, Baltzer & Steward.

Turn the page

IT PAYS TO STANDARDIZE ON **STANSCREW**

Stanscrew fasteners add to reliability of SPEED QUEEN appliances

Speed Queen laundry appliances are built to take a beating. In these automatic washers and dryers, components are necessarily subjected to vibration, heat, moisture, and customer abuse . . . must withstand punishment year after year if Speed Queen's outstanding reputation for quality is to be upheld.

For example, consider the socket set screw being inserted on the motor pulley above. Should this loosen, the customer would have to pay for a service call . . . and Speed Queen would have to pay in consumer dissatisfaction. Therefore, to maintain rigid quality standards, Speed Queen has chosen Stanscrew fasteners for this and other demanding applications.

Despite their high standards of quality, Stanscrew fasteners are economically priced. And they are offered in a comprehensive selection of over 5,500 different types and sizes to meet the overwhelming majority of all fastener requirements. All 5,500 are quickly available through your local Stanscrew distributor.

Call your Stanscrew distributor today. He will arrange a visit from a Stanscrew fastener specialist who can often suggest ways to cut assembly or fastener costs . . . for example by substituting an inexpensive standard fastener for a costly special.

STANSCREW FASTENERS

CHICAGO | THE CHICAGO SCREW COMPANY, BELLWOOD, ILLINOIS
HMS | HARTFORD MACHINE SCREW COMPANY, HARTFORD, CONNECTICUT
WESTERN | THE WESTERN AUTOMATIC MACHINE SCREW COMPANY, ELYRIA, OHIO

STANDARD SCREW COMPANY 2701 Washington Boulevard, Bellwood, Illinois

Professor Lucius von Hausen, of aeronautics fame, reads in a balloon.

"Sort of keeps me on top of things," he says. Fair enough . . . but other engineers and executives prefer to read with their feet on the ground, especially when they're reading about business. Remember, a good place to read is a good place to think . . . and if you pay engineers and managers to think, encourage them to do more reading. Like so many successful men who read their "most useful" McGraw-Hill publications, they'll find the best place . . . home or plant, office or hammock. But wherever they read, remember, you share in the rewards.*

**Yes, when they read, you profit, too. Write on your business letterhead for a personal copy of booklet, "The McGraw-Hill Engineered Reading Program."*

ADVERTISERS' LITERATURE

Begins on page 250

Offered in ads received up to 5th of last month. To get items you want, circle numbers on Reader Service Card next to back cover.

340—Automation tools. Here are descriptive literature and tracing templates on drilling, other tools. Buckeye Tools Corp.

341—Heat exchangers. Bulletin P60 contains details on structural features and applications. Tranter Mfg., Inc.

342—Pressure sensitive tapes. Folder, "Visualization Made Easier," shows method for graphs, etc. Chart-Pak, Inc.

343—Honing machine. Literature and prices on complete line, including new model J2 machine. Superior Hone Corp.

344—Drill presses. Brochure gives specifications, other details on line of new 17-in. presses. Rockwell Mfg. Co.

345—Nut running tools. Catalog 30-A on ¼- to ⅝-in. square, hex-drive models is free. Apex Machine & Tool Co.

346—Nut running tools. Catalog 30-B for sizes ¾- to 3½-in. square, hex-drive models. Apex Machine & Tool Co.

347—Screwdriving tools. Catalog 30-C gives complete data, sizes for varied applications. Apex Machine & Tool Co.

MECHANICAL

348—Shaft-mounted drives. Bulletin 7100 covers shaft- and flange-mounted screw conveyor drives. The Falk Corp.

349—Speed reducers. Bulletin 1100 on parallel shaft to 3500 hp.; also right angle, other designs. The Falk Corp.

350—Couplings. Bulletin 4100 on all-steel, torsionally resilient couplings in 34 sizes. The Falk Corp.

351—Motoreducer. Bulletin 3100 on horizontal, vertical, right-angle models to 75 hp. The Falk Corp.

352—Belting. Catalog describes Suplex oil-resistant belting; comes in fractional hp. to 1000 hp. R. & J. Dick Co., Inc.

353—Dry fluid drive. Bulletin tells about capacities that range from fractional to 1000 hp. Dodge Mfg. Corp.

354—Speed reducers. Booklet gives full data on shaft-mounted, torque-arm speed reducers. Dodge Mfg. Corp.

355—Chain couplings. Bulletin contains information on taper-lock chain couplings, sprockets. Dodge Mfg. Corp.

356—Bearings. Bulletin covers SC, SCM ball-bearing pillow blocks for normal and medium duty. Dodge Mfg. Corp.

The Allis-Chalmers Extrusion
Interlocking modular panels snap together, forming a permanent, leakproof joint. Extruded joint sections every six inches produce a structurally reinforced panel-wall for a rigid, clean installation.

A new metal for switchgear housings!

Allis-Chalmers *aluminum* switchgear housings offer:

- easy installation
- attractive appearance
- corrosion resistance
- lower maintenance

For more details on aluminum housings . . . or steel, contact your nearby A-C office or write **Allis-Chalmers,** *Power Equipment Division, Milwaukee 1, Wisconsin.*

ALLIS-CHALMERS

A-1407

For more facts Circle 562 on Reader Service Card

Choose from 54 models of the "best workers" you will ever have in your shop!

E-Z LIFT

MODEL B-57

Complete with batteries and built-in charger—1500 lb. capacity—57" lifting ht.—manually propelled—power lift.

$297.

Power Propelled MODEL W-57

Complete with batteries and built-in charger—1500 lb. capacity—57" lifting ht.

$997.

Power Propelled MODEL WT-110

Complete with batteries and built-in charger—1500 lb. capacity—110" lifting ht.

$1497.

FREE—Send for complete catalog and price list describing all 54 standard models.

CROWN CONTROLS CO., INC.

TORY AVENUE • NEW BREMEN, OHIO

For more facts Circle 563 on Reader Service Card

Wipco Wire Partitions

FIT ANY AREA

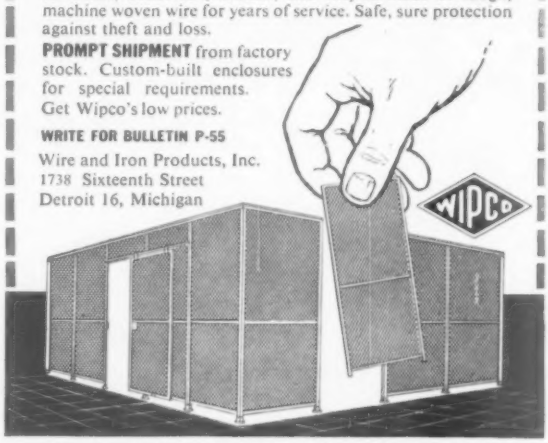
MOVEABLE—REUSABLE—FLEXIBLE! Standard sections in a variety of sizes for stock rooms, tool rooms, runways, etc. Each section a complete unit ready for erection. No special tools . . . no special crews. Your men install Wipco partitions quickly and easily. Future changes? Just disassemble and re-locate!

COST LESS THAN WOOD FRAMING AND WIRE NETTING Cheaper to install, easier to maintain, and they're made of tough, machine woven wire for years of service. Safe, sure protection against theft and loss.

PROMPT SHIPMENT from factory stock. Custom-built enclosures for special requirements. Get Wipco's low prices.

WRITE FOR BULLETIN P-55

Wire and Iron Products, Inc.
1738 Sixteenth Street
Detroit 16, Michigan



For more facts Circle 564 on Reader Service Card

Wiley BOOKS

WAREHOUSE OPERATIONS PLANNING AND MANAGEMENT

By ANDREW J. BRIGGS,

Service Building Superintendent, May Company.

Step by step this new book sets forth specific, *practical* approaches, leading the reader easily and directly through all stages—planning, organizing, managing, and operations. Stripped of unnecessary charts, tables, and possibly confusing alternatives, it is designed to give the materials handling engineer and warehouse manager a sharply defined picture of what he needs and wants to know.

". . . the most comprehensive, intelligent, easy reading and informative treatise on the subject that I have ever read. It is certainly a book that will be found to be of inestimable value . . ."—W. B. SEMCO, *President, Semco, Sweet & Mayers, Consulting Industrial Engineers.*

1960 *303 pages* *$8.50*

SEND NOW FOR YOUR ON-APPROVAL COPY

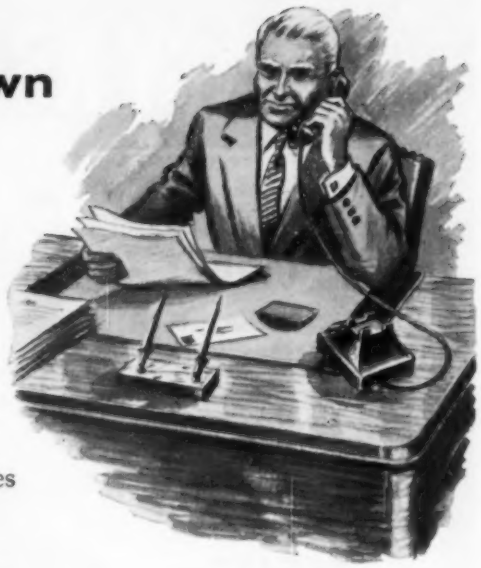
JOHN WILEY & SONS, Inc.

440 PARK AVE. SOUTH, NEW YORK 16, N. Y.

For more facts Circle 565 on Reader Service Card

When you send word down the line to cut costs...

here's something else you can do



Pick up the phone — call your local Bellows-Valvair Field Engineer — ask him to show you and your production managers his "Spot-a-mation File" — scores of cost-cutting ideas that can be applied to an almost unlimited range of operations in any industry. These are practical, proven ideas. They have been furnished to us by companies whose production people are faced with the same problems as yours. You can adapt, modify or tailor these ideas to your operations, in your own tool room, without much in the way of capital investment. And you can do it quickly.

If you prefer:

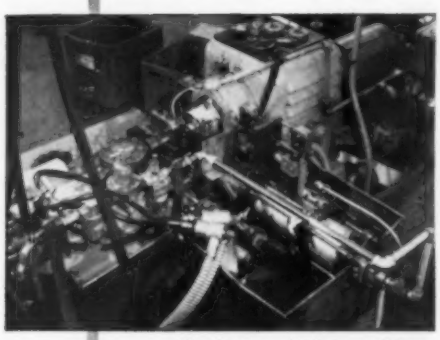
Drop us a note on your letterhead and ask for a set of the SPOT-A-MATION FILES. No cost. Just write Dept. FA-161, Bellows-Valvair, Akron 9, Ohio.

Bellows-Valvair

AKRON 9, OHIO

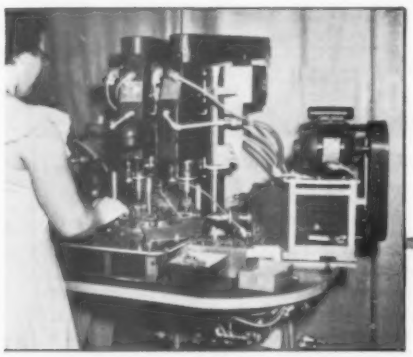
DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)

TYPICAL

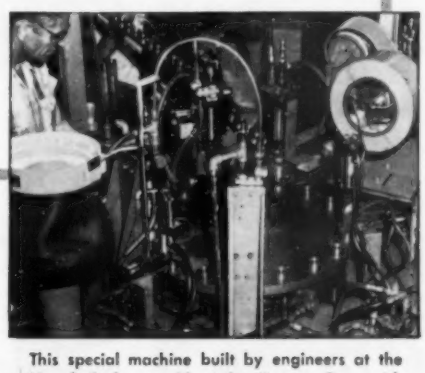


The Minneapolis-Honeywell Regulator Company was able to reduce the cost of this operation from $17.40 per thousand to $14.36 per thousand by installing Bellows Air Motors on a standard turret lathe.

962-C



The cost of this multiple drilling operation on a small brass part was dropped from $1.53 per hundred parts to 15 cents per hundred with this tool-room-built special machine made with Bellows-Valvair work units.



This special machine built by engineers at the Naval Ordnance Plant in Macon, Ga., with Bellows-Valvair "Controlled-Air-Power" work units saved $82,754.00 on one contract alone.

AS EASY AS

STRIP
with **CINDET**

Old wax film comes up on contact with this detergent. The stripping is quick, easy.

REFINISH
with **NOFALS**

Mop on 2 thin coats of this hard, glossy, plastic finish: produce a laminated coating.

DRY SWEEP ONLY Up to 10 WEEKS with MOPWHYTE*

*or GRIPDUST aerosol spray

THE PEDSO METHOD OF FLOOR MAINTENANCE

- NO Black Traffic Marks
- NO Damp Mopping
- NO Buffing
- Sweeping Is Dustless
- Lasts Weeks and Weeks
- Hard Gleaming Plastic Finish

THE PEDSO METHOD (Plastic Emulsion Dry Sweep Only)

For information about this method ask your Dolge Service Man or write:

dependable DOLGE
WESTPORT, CONNECTICUT

260 For more facts Circle 567 on Reader Service Card

Seiberling
INDUSTRIAL GLOVES

Longer wear in every pair! Available in various sizes, gauges, lengths, colors and surface finishes. Natural rubber or genuine Dupont neoprene latex. Contoured fingers for more comfort, better fit.

EXCLUSIVE PATENTED
FIRMGRIP®
SAFETY GRIP MOULDED INTO FINGERS AND PALM

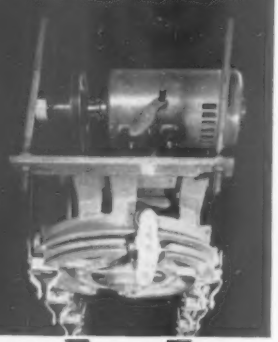
SEND FOR CATALOG NO. G-3 of complete glove line

FREE TEST OFFER!
Write us on your firm's letterhead for sample gloves for test purposes.

SEIBERLING LATEX PRODUCTS
New Bremen, Ohio

For more facts Circle 568 on Reader Service Card

UNDER $1000!
100-FOOT AMERICAN "Cable-Way" U-Install CONVEYOR



100 feet of track, complete with drive unit, trolleys, cable and take-up corner

Move parts weighing up to 80 lbs. on this 100-foot continuous "Cable-Way" Conveyor. Spans a distance of 50 feet. No engineering — install it in a day or two. Price per foot decreases if a longer system is desired. All-bolted track. Other trolleys available for heavier loads. Send us a diagram of your layout. Hanger rods and trolley attachments extra. Write for Catalog CD-B.

© THE AMERICAN MONORAIL CO. • 1960

CONVEYOR DIVISION
THE AMERICAN MONORAIL CO.
Fourth & Franklin Streets • Tipp City 4, Ohio
In Canada: Canadian MonoRail Co. • Galt, Ont.

For more facts Circle 569 on Reader Service Card

REPRINTS OF FACTORY'S 1960 ARTICLES

There are many uses for copies of these popular FACTORY articles in useful reprint form.

Here are a few suggestions:

- Assemble reference material on current plant problems
- Broaden your knowledge in plant operations management
- Pass along information to your associates
- Add supplementary supporting data to your reports and proposals
- Provide materials for specific training and management development programs
- Build a file of handy help on plant operations management
- Replace articles you have lost or overlooked.

These reprints are easy to get. Check the list below. The titles are classified in the broad categories of FACTORY's Problem-Solving Guide. Use the coupon to order the reprint numbers and quantities you want. Fill in the rest of the coupon and mail. We'll give it prompt attention.

Prices of single copies are noted in the lists.
Prices for more than one copy of a reprint number are as follows:

Quantity	35¢ Reprints	50¢ Reprints	75¢ Reprints
2 to 24	25¢ each	40¢ each	60¢ each
25 to 99	20¢ each	35¢ each	50¢ each

100 or more: Ask for quotations on specific quantity.

The list on this page includes only a portion of FACTORY articles available in reprint form. For a complete list check the box in the coupon and mail.

PLANT MAINTENANCE AND ENGINEERING

35¢ Each

221 Spot Heating
224 Two New Ways to Measure Maintenance Efficiency
233 Critical Path Scheduling
236 Tips on Low-Cost Buildings
239 Noise Control
240 Truth About Industrial TV
242 Compressed Air Systems
244 Electrical Dangers Check List
248 Maintenance Painting

50¢ Each

220 Maintenance Training

PRODUCTION

35¢ Each

227 Production Counting
230 Three New Rules for Better Plant Layout
231 Scrap Recovery
234 Production Painting
246 Robot Instructors

50¢ Each

219 Synthetic Adhesives
225 Warehousing Today

75¢ Each

235 Controlled Plant Information
245 Atlanta Survey of Material Handling

PLANT MANAGEMENT

35¢ Each

223 The Incentive Audit
226 The Problem Manager
228 Stop Misusing Your Management Meetings
232 Decisions, Decisions
237 Inside the Political Arena
238 Your Part in Unemployment
243 Job Evaluation
247 Seniority
249 Better Records Management

50¢ Each

222 Featherbedding—Symptom of Management Failure
241 Scientific Management

75¢ Each

229 Should You Play the Game of Politics

Reader Service Department
FACTORY
330 West 42nd Street, New York 36, N. Y.

Please send me the reprints I have asked for in the blank spaces at the right.

I enclose $_____ by check ☐, money order ☐, cash ☐.

☐ Please send me a complete list of FACTORY reprints.

NAME .....
COMPANY .....
STREET .....
CITY ..... ZONE ..... STATE .....

Reprint No.	Copies Wanted	Price Each	Total Amount
			$
Total			$

"Why not cut out advertising and use the money to hire more salesmen?"

ROBERT HELLER, for 30 years a consultant to management of leading industrial firms and head of Robert Heller & Associates, Inc., Cleveland, answers a question that has crossed the minds of countless business executives.

"Advertising, although indispensable in our modern economy, can never perform the entire marketing job by itself. But neither can direct selling, nor any other single one of such sales-producing influences as publicity, packaging, service or sales promotion that make up the marketing tool kit.

"While circumstances may very well indicate a downward adjustment of advertising expenditures in order to put increased emphasis on personal selling, the reverse may be equally true. Particularly if the functions performed in a salesman's call costing $25.00 or more can be discharged satisfactorily by communication via advertising at a fraction of that figure.

"It is impractical, therefore, to talk of eliminating any one marketing activity in favor of another. Instead, the question is one of weighing all of the influencing factors to strike a proper balance."

AIA

ASSOCIATION OF INDUSTRIAL ADVERTISERS

271 madison avenue • new york 16, n. y. • telephone murray hill 5-8921

An organization of over 4000 members engaged in the advertising and marketing of industrial products, with local chapters in ALBANY, BALTIMORE, BOSTON, BUFFALO, CHICAGO, CLEVELAND, COLUMBUS, DALLAS, DENVER, DETROIT, HAMILTON, ONT., HARTFORD, HOUSTON, INDIANAPOLIS, LOS ANGELES, MILWAUKEE, MINNEAPOLIS, MONTREAL, QUE., NEWARK, NEW YORK, PHILADELPHIA, PHOENIX, PITTSBURGH, PORTLAND, ROCHESTER, ST. LOUIS, SAN FRANCISCO, TORONTO, ONT., TULSA, YOUNGSTOWN.

WHERE TO BUY

Featuring additional products, specialties & services for manufacturing plants

QUICK COUPLERS

You can save 75% of the time it takes to couple and uncouple hose and pipe connections . . . by using Kamlok Quick Couplers. Why not save that time? Send for information.

OPW-JORDAN 6013 Wiehe Road Cincinnati 13, Ohio

INDUSTRIAL CONSULTANTS

DRAKE, STARTZMAN, SHEAHAN and BARCLAY
Distribution and Materials Handling Consultants
"Control, Movement and Storage of Materials"
41 East 42nd Street New York 17, N. Y.

GEMAR ASSOCIATES
CONSULTING
MATERIALS HANDLING ENGINEERS
over 25 years experience
Greenwich, Connecticut

METHODS ENGINEERING COUNCIL
DIVISION OF H. B. MAYNARD AND COMPANY, INCORPORATED
MANAGEMENT CONSULTANTS
718 Wallace Ave.—Pittsburgh 21, Pa.

E. RALPH SIMS, JR. AND ASSOCIATES
Consulting Industrial Engineers
Management Consultants
Planning, Design, Management, and Control of Mfg. and Distribution Operations and Facilities
436 North Maple Street, Lancaster, Ohio

READERS MAY CONTACT the consultants whose cards appear on this page with the confidence justified by the offering of these special services NATIONALLY.

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT: BUSINESS: **"OPPORTUNITIES"** :EQUIPMENT :USED OR RESALE

UNDISPLAYED ——RATES—— **DISPLAYED**

(Not available for Equipment Advertising)
$2.40 per line, minimum 3 lines. To figure advance payment count 5 average words as a line.
Positions Wanted take one-half of above rate.
Box Numbers in care of our New York, Chicago & San Francisco offices count as one additional line.
Discount of 10% if full payment is made in advance for 4 consecutive insertions.
Feb. issue closes Jan. 17th in N. Y.

Individual Spaces with border rules for prominent display of advertisements.
The advertising rate is $27.50 per inch for all advertising appearing on other than a contract basis. Contract rate quoted on request.
Employment Opportunities—$37.40 per inch, subject to Agency Commission.
An advertising inch is measured ⅞" vertically on one column, 3 columns—30 inches—to a page.

MANUFACTURING VICE PRESIDENT

Midwestern multi-plant manufacturer has excellent opportunity for outstanding manufacturing executive. We need a man strong in the ability to get things done; in abilities in areas of controls, costs, planning and scheduling; and especially in ability to teach and build a strong team. Experience in medium to large job shop involving sheet metal fabricating, machining, and assembly is highly desired. Age is open. Salary $30,000 up, with generous retirement plan. Full details of your background are welcomed in confidence.

P-5800 FACTORY
520 N. Michigan Ave., Chicago 11, Ill.

DIAL TELEPHONE $8.95!
Gov't surplus-factory reconditioned. Standard type with coil cord, complete with wire, fully guaranteed. Add $2.00 if plug is required. *Write for list. Shipments F.O.B.*
SURPLUS SAVING CENTER
Waymart Dept. FAC-11 Penna.

ADDRESS BOX NO. REPLIES TO: Box No. Classified Adv. Div. of this publication. Send to office nearest you.
NEW YORK 36: P. O. BOX 12
CHICAGO 11: 520 N. Michigan Ave.
SAN FRANCISCO 4: 68 Post St.

POSITIONS WANTED

Industrial Engineer, Graduate, Age 27, Married. Five years of excellent experience with industry and U.S. Air Force. Separating in April. Strongly interested in production problems, cost reduction, and a future in management. Desire opportunity to prove my value in a medium or small western company. Resume upon request. PW-5772, Factory.

Personnel College, 10 yrs. experience: counseling, testing, claims investigation, suggestion awards, fleet & industrial safety, West Coast. PW-5779, Factory.

EMPLOYMENT SERVICE

Salaried Personnel—$6,000-$30,000. This nation-wide service successful since 1927 finds openings in your field. Sells your abilities; arranges contacts. Present position protected. Write for details. Address: Jira Thayer Jennings, Dept. F, P.O. Box 674, Manchester, Vermont.

SPECIAL SERVICE

Time Study Boards with transparent watch hold-ers, stop watches, Pedometers, Slide Rules, Forms in stock. Sample Kit Free. Oznam Products Co., 5544 S. Homan Ave., Chicago 29.

Your Inquiries to Advertisers Will Have Special Value . . .

—for you—the advertiser—and the publisher, if you mention this publication. Advertisers value highly this evidence of the publication you read. Satisfied advertisers enable the publishers to secure more advertisers and — more advertisers mean more information and more products or better service — more value — to YOU.

PLANT MANAGER

WIRE MANUFACTURING FACILITY

- A subsidiary of a major electronics organization is seeking an experienced production executive who can assume complete plant management responsibility of an extrusion mill producing electronic and electrical wire and cable. Broad experience in a similar operation is required.

- The successful applicant will be rewarded by a substantial salary, appropriate management incentives and an unlimited future with one of the fastest growing companies in industry today.

Box FM 1378, 125 West 41 Street, NY 36

MACHINE DESIGNER
$10,000 - $12,000
Medium sized, fast growing manufacturer desires aggressive mechanical engineer whose ability, competence and engineering ingenuity will enable him to reach an advanced management position in a minimum of time. Fee paid.
MONARCH PERSONNEL
28 East Jackson, Chicago 4, Illinois

You Asked for It!

Here it is at only

$495.00

The

NEW SUPERIOR MODEL "J2"

Honing Machine

Automatic honing in production runs, tool room work and salvage operations is now within the reach of everyone.

FEATURES:

- ★ Infinitely variable spindle speeds (225—525 rpm standard; 450—1050 rpm optional.)
- ★ ½ HP, 110-V, 60 cy. single phase motor.
- ★ Complete drive, motor and removable 14-gal. coolant tank enclosed in ventilated heavy steel base.
- ★ Tray top. ★ Sealed ball bearing spindle. ★ Anti-splash screen. ★ Splash guards.

OPTIONAL:

- ★ Dial indicator.
- ★ Full width extension tray.
- ★ Filter tray with 3 settling baffles and burlap filter.

There's a Superior Honing Machine for Every Honing Job

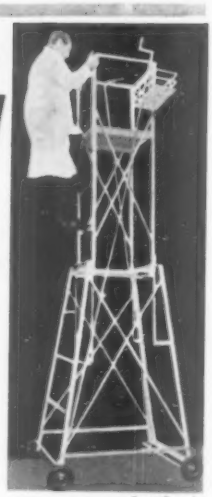
Send for literature and prices

SUPERIOR HONE CORPORATION

1011 TENNESSEE ROAD ERWIN, TENNESSEE

For more facts Circle 570 on Reader Service Card

He propels "MOVE-ON" along without climbing down



As soon as the man on the platform has finished one job, he can WITHOUT CLIMBING DOWN, propel "MOVE-ON" to the next, no matter whether it is in front, behind, or even around a corner. Ideal and economically priced for decorators, electricians, cleaning and maintenance men and all other overhead workers.

Pat. Pend.

SELF-PROPELLED STAGING

For quicker, safer, cheaper overhead work

Two Models Are Available:

MODEL "B" (Illustrated) gives working heights up to 16 ft.
MODEL "A" gives working heights up to 11 ft.

***WRITE** for further information and name of nearest dealer*

ANDERSTON CLYDE, INC.

144 HARVARD AVENUE
(ALLSTON) BOSTON 34, MASSACHUSETTS

For more facts Circle 571 on Reader Service Card

Modern industry uses KROIL

. . . when some stuck together part threatens production. They won't take a chance on breaking the part with brute strength.

KROIL LOOSENS FROZEN PARTS

As one customer said, **"Kroil loosens everything from an embalmer's needle to a bulldozer."**

Another wrote, **"Before trying Kroil on heat treat trolleys, we broke off every nut . . . since then we have not lost one."**

You, too, can get these results. Try Kroil on our make-good guarantee. Accept our combination offer, a gallon of Kroil, $4.35, and a Kroiler (squirt gun worth $1.50) for $5.25, F.O.B. Nashville. Order direct.

KANO LABORATORIES

1067 THOMPSON LANE • NASHVILLE, TENNESSEE

For more facts Circle 572 on Reader Service Card

Index To Advertisements

Acme Visible Records, Inc. 180
Allen-Bradley Company 17, 18
Allis-Chalmers 149, 214, 215, 257
American District Telegraph Co. 154
American Monorail Company 223
Conveyor Division 260
American Optical Company 116
American Sealants Company 125
American Standard, Controls Div. 165
Industrial Division 115
American Viscose Corporation 199
Anaconda Wire & Cable Co. 242
Anderston Clyde, Inc. 264
Apex Machine & Tool Co. 10
Armco Drainage & Metal Products, Armco Steel Corporation 212
Arno Adhesive Tapes, Inc. 118
Austin-Western Construction Equipment Div., Baldwin-Lima-Hamilton 253
Automatic Transportation Company 159

Barber-Colman Company 135
Barclay Mfg. Co. 188, 189
Barreled Sunlight Paint Co. 151
Bassick Company 176
Bell & Gossett Company 217
Bellows-Valvair, Div. of International Basic Economy Corp. 259
Bennett Manufacturing Co. 248
Bessemer & Lake Erie Railroad 198
Binks Manufacturing Company 134
Black & Decker Mfg. Co. 132, 133
Borroughs Manufacturing Co. 222
Boston Gear Works 173
Bradley Washfountain Co. 178
Bruning Brothers, Inc. 252
Buckeye Tools Corporation 208
Buffalo Forge Company 226, 227
Bussmann Mfg. Div., McGraw-Edison Co. 26, 27
Butler Manufacturing Co. 126, 127

Chart-Pak, Inc. 207
Chicago Tramrail Corporation 108
Chisholm-Moore Hoist Div., Columbus McKinnon Corp. 141
Clarage Fan Company 95
Clark, Cutler, McDermott Co. 130
Clark Door Company, Inc. 146
Cleveland Tramrail Div., Cleveland Crane & Engineering Co. 83
Columbus-McKinnon Corporation .. 134
Crescent Tool Company 16
Crown Controls Co., Inc. 258
Curtiss Wright, Marquette Div. 102
Cutler-Hammer, Inc. 112, 113

Delta Power Tool Div., Rockwell Mfg. Co. 20, 21
Detecto Scales, Inc. 224
Dick Company, Inc., R. & J. 19
Dodge Manufacturing Co. 90, 91
Dolge Co., C. B. 260
Dow Corning Corporation 7
Dunham-Bush, Inc. 209

Eagle Manufacturing Co. 158
Eastman Kodak Company 195
Economy Engineering Co. 177
Electric Storage Battery Co. 187
Esterline-Angus Instrument Co. 93

Factory 261
Fairbanks Co. 128, 152, 164
Fairbanks-Morse & Co. 219
Falk Corporation 107
Faultless Caster Corporation 172
Felters Company 161
Finnell Systems, Inc. 137
Foster Company, L. B. 194

Gardner-Denver Company 111
General Electric Company 142, 143
Lamp Department 96
General Services Administration 254
Gloekler North East Co., Bernard 246
Globe Company 156
Goodrich Company, B. F. 1
Goodyear, Industrial Products Div. 14, 15
Gould-National Batteries, Inc. 221
Graphic Systems 252
Grinnell Company ..... Second Cover

Harnischfeger Corporation 103, 104
Hough Company, Frank G. 94

International Business Machines .. 22, 23
Invincible Vacuum Cleaner-Mfg. Co. 11

Janitrol, Heating and Air Conditioning Div. of Midland-Ross Corp. 204, 205
Jarke Manufacturing Co. 87
Jones & Lamson Machine Co. 185
Johnson Service Co. 32, 33
Joy, Electrical Products Div. 177

Kano Laboratories, Inc. 264
Kerrigan Iron Works, Inc. 220
Kex National Service 166
Kidde & Co., Walter 150
Kirk & Blum Mfg. Co. 110
Koppers Company, Inc. 247

La Deau Manufacturing Co. 248
Lawter Chemicals, Inc. 157
Lear, Inc., Electro-Mechanical Div. .. 9
Legge Company, Inc. Walter G. 179
Lewis Company, G. B. 177
Lincoln Electric Company 28, 29
Link-Belt Company 12, 13
Louden Machinery Company 203
Louisiana Department of Commerce and Industry 98
Lyon Metal Products, Inc. 119
Lunkenheimer Company 266

Magnetics, Inc. 85
Mahon Company, R. C. 89
McGraw-Hill Book Company 164
Mine Safety Appliances Co. 210, 211
Mobil Oil Company 144, 145
Motorola Communications & Electronics, Inc. 155
Multistamp Co. 218

Norwalk Company, Inc. 224

OPW-Jordan Corporation 263
Owatonna Tool Company 196

Pangborn Corporation 190, 191
Pannier Master Markers 202
Peelle Company 168
Pennsalt Chemicals Corp. 140
Philco, Government & Industrial Group 117
Pittsburgh Plate Glass Co., Fiber Glass Div. 201
Post Electronic Products, Div. of Reid Bros. Co., Inc. 246
Protectoseal Company 171
Puritan Chemical Company 99

Radiant Lamp Corporation 124
Rapids-Standard Co., Inc. 30, 31
Raymond Corporation 97
Ready Made Sign Co., Inc. 220
Republic Steel Corporation 24, 25
Revolvator Company 100
Ridge Tool Company 153
Roebling's Sons Div., John A., Colorado Fuel & Iron Corp. 225
Rol-a-chart 224
Rome Cable Division of Alcoa 175
Rosemount Engineering Co. 248
Rotary Lift Company 6
Roura Iron Works, Inc. 206
Royal McBee Corporation 251
Royal Metal Manufacturing Co. 170
Rust-Oleum Corporation 181
Ryerson & Son, Inc., Joseph T. 34

Seiberling Latex Products 260
Service Recorder Company 244
Shepard Niles Crane & Hoist Corp. .. 8
Simplex Wire & Cable Company 129
SKF Industries, Inc. 40
SKIL Corporation 131
Smith Corporation, A. O. 180
Snap-on Tools Corporation 200
Snap-Tite 5
Spencer Turbine Company 148
Square D Company .. 120, Third Cover
Standard Conveyor Company 105
Standard Pressed Steel Company 167
Standard Screw Company 255
Sten-C-Labl, Inc. 250
Stromberg-Carlson, Div. of General Dynamics Corp. 109
Sugar Beet Products Co. 162
Superior Hone Corporation 264
Supreme Products Corporation 101

Taylor Co., Halsey W. 106
Tennant Co., G. H. 171
Texaco, Inc. 241
Timken Roller Bearing Co. Fourth Cover
Toledo Pipe Threading Machine Co. 179
Tomkins-Johnson Co. 39
Torit Manufacturing Co. 213
Towmotor Corporation 4
Tranter Manufacturing, Inc., Platecoil Div. 169
Triax Company 228
Typhoon Air Conditioning Div., Hupp Corporation 249

United Motors System 192
United Scale Models, Inc. 252
Universal Metal Hose Company 118
Up-Right Scaffolds, Inc. 163

Valdura Paint Div., American-Marietta Co. 164

Weld-Record Corporation 254
Whiting Corporation 197
Wilbur & Williams Co., Inc. 147
Wiley & Sons, John 258
Wilson Rubber Company 245
Wire & Iron Products, Inc. 258
Wood's Sons Co., T. B. 92
Wright Hoist Div., American Chain & Cable Co., Inc. 160

Yale & Towne Mfg. Co. 138, 139

■

Industrial Consultants 263

■

SEARCHLIGHT SECTION
(Classified Advertising)
F. J. Eberle, Business Mgr.

■

Employment Opportunities 263
EQUIPMENT
(Used or Surplus New) For Sale 263
Special Services 263

Now! The LUNKENHEIMER BALL VALVE

Fig. 700-T
¼" to 2", Screw Ends, Bronze Body, Teflon Seats and Seals.

Fig. 700-B
¼" to 2", Screw Ends, Bronze Body, Buna-N Seats and Seals.

AVAILABLE SOON in OTHER MATERIALS

New Top-Entry Design

Engineered with traditional Lunkenheimer quality . . . self-aligning ball seals against both seats . . . long-lasting resilient seats for tight shut-off . . . straight-through flow . . . quarter-turn operation . . . top entry for easy maintenance

or write The Lunkenheimer Company, Cincinnati 14, Ohio

L-966-3

LUNKENHEIMER®
THE ONE *Great* NAME IN VALVES
• BRONZE • IRON • STEEL • PVC

Want more information?

The editors of FACTORY provide this Reader Service Card as just that . . . a means by which you, the reader, can be serviced further. By using either of the two postcards below, which don't even require stamps, you can obtain more information on items mentioned in this issue's EQUIPMENT NEWS . . . MATERIALS NEWS . . . and IDEAS OF THE MONTH. You can get the catalogs described in the CATALOG NEWS and ADVERTISERS' LITERATURE columns. You can ask manufacturers for more data on ADVERTISED ITEMS.

TO SUBSCRIBE
Use handy order card in center of magazine

Don't forget to write your name and address—First thing to do is fill in your name, title, and address information on *either* postcard on this page. Circle key numbers — again on either postcard—corresponding to those on items in Catalog News, Equipment News, Materials News, Ideas of the Month, and Advertisers' Literature; and on advertisements of products or services on which you want more facts. Then mail; no postage necessary.

To correct your FACTORY mailing address—Just put your name and *new address* on the lines provided on either postcard at right. Then write *clearly* across the postcard: ADDRESS CHANGE. *Please add your old address.* Then just drop in the mailbox. We'll make the change as quickly as possible, so you won't have to wait for your issue of FACTORY.

CATALOGS —	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56
57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	78	79	80	81	82	83	84	85	86	87
EQUIPMENT —	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106							
107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128					
129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150					
151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172					
173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194					
MATERIALS —	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213							
214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235					
IDEAS OF THE MONTH —	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252									
253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274					
ADVERTISERS LITERATURE —	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290										
291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312					
313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334					
335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356					
357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378					
ADVERTISEMENTS —	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399								
400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421					
422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443					
444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465					
466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487					
488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509					
510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531					
532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553					
554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575					
576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597					
598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619					
620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641					
642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	999					

NAME..... TITLE.....

Card Good Only Through April 1961

COMPANY..... January 1961-2

CITY AND STATE

STREET.....

CATALOGS —	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56
57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	78	79	80	81	82	83	84	85	86	87
EQUIPMENT —	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106							
107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128					
129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150					
151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172					
173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194					
MATERIALS —	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213							
214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235					
IDEAS OF THE MONTH —	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252									
253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274					
ADVERTISERS' LITERATURE —	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290										
291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312					
313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334					
335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356					
357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378					
ADVERTISEMENTS —	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399								
400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421					
422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443					
444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465					
466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487					
488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509					
510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531					
532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553					
554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575					
576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597					
598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619					
620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641					
642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	999					

NAME..... TITLE.....

Card Good Only Through April 1961

COMPANY..... January 1961-1

CITY AND STATE

STREET.....

Reprints of most useful articles

These popular FACTORY articles are still available in useful reprint form:

No. 245	**Atlanta Survey of Material Handling** Study of methods and practices in 80 Atlanta plants	75¢*	60¢	50¢
No. 248	**Maintenance Painting** Engineering and Technology Report No. 9	35¢	25¢	20¢
No. 249	**Better Records Management** 150 ideas for improving control of paperwork	35¢	25¢	20¢

* First price, single copies; second price, 2–24 copies; third price, 25–99 copies.

Mail your order to Reader Service Department, FACTORY, 330 West 42nd St., New York 36, N. Y. Send check, money order, or cash — or ask us to bill you.

Over 100 helpful articles are available. For a complete list, circle 999 on the Reader Service Card. (Fill in reverse side of card below.)

FIRST CLASS
PERMIT No. 22876
PHILADELPHIA, PA.

BUSINESS REPLY MAIL
No Postage Stamp Necessary if Mailed in the United States

POSTAGE WILL BE PAID BY
McGRAW-HILL PUBLISHING CO., INC.

FACTORY
c/o Computer Center
P. O. Box 7972
Philadelphia 1, Pa.

FIRST CLASS
PERMIT No. 22876
PHILADELPHIA, PA.

BUSINESS REPLY MAIL
No Postage Stamp Necessary if Mailed in the United States

POSTAGE WILL BE PAID BY
McGRAW-HILL PUBLISHING CO., INC.

FACTORY
c/o Computer Center
P. O. Box 7972
Philadelphia 1, Pa.

Catalogs in This Issue

To help you, here is a list of catalogs described in this issue. To obtain, circle key numbers on either postcard.

BUILDING

1—Overhead-type door
2—Glass blocks, modules
3—Rolling door operator
4—Gate operators

AUXILIARY

5—Liquid phase heater
6—Air conditioning
7—Gas turbine
8—Vertical compressor package
9—Filters
10—Heaters

ELECTRICAL

11—Switching centers
12—Panels, switches
13—Transformers
14—Pilot devices
15—Electron tubes
16—Connectors, switches
17—Control units
18—Motors

MATERIAL HANDLING

19—Fork-lift trucks
20—Benches, bins, carts
21—Crane weight indicator
22—Lift truck
23—Strapping tools
24—Belt conveyors
25—Trucks

INSTRUMENTS AND CONTROLS

26—Electronic controls
27—Hardness tester
28—Time recorders
29—Process control instruments
30—Recorders, indicators
31—Tachometer

VALVES AND FITTINGS

32—Regulators, valves
33—Handwheel valves
34—Air control valves
35—Hose
36—Tube fittings
37—Valve actuator

MAINTENANCE

38—Groove pins, drive studs
39—Filter vacuum cleaner
40—Eye, face protection
41—Shovels, scoops, spades
42—Eye, face protection

PRODUCTION

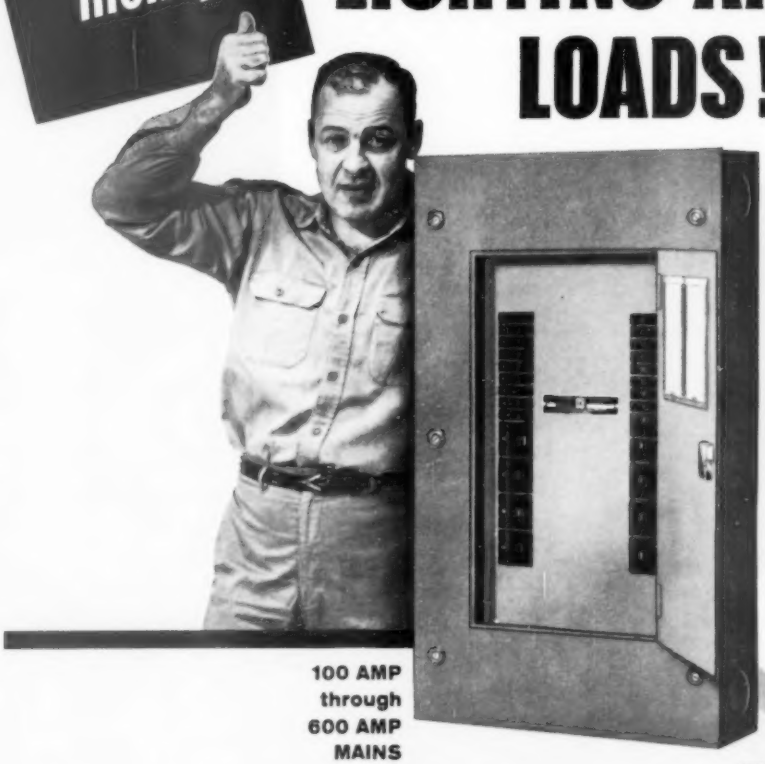
43—Air tools, accessories
44—Horizontal boring machines
45—Radial drill
46—Tangent bending machine
47—Barrel-finishing machines
48—Chucking machines
49—Automation system
50—Lathe, drills
51—Cutting machine
52—Welding supplies
53—Welder

MECHANICAL

54—Variable speed drive
55—Hydraulic motors
56—Drives

SAVE- space time money

Same PANELBOARD COMBINES *Both* LIGHTING AND POWER LOADS!



100 AMP through 600 AMP MAINS

NQO Panelboard

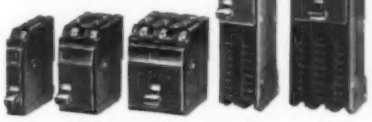
Heavy Duty Construction!

• Why waste time, space and money by installing separate lighting and power panelboards? Square D now makes it easy to combine 120 and 240 volt lighting and power loads up to 100 amperes, into one panel. Equally important, thanks to plug-in design and a complete range of circuit breakers (*at right*), you can get a real heavy duty industrial type panelboard with exactly the circuits you need — right out of your Square D distributor's stock*... ***Write for the complete story. Address Square D Company, 1601 Mercer Road, Lexington, Kentucky***

*NQO (plug-in) and NQOB (bolted connection) panelboards are also available factory-assembled for shipment direct to the job

FINEST BREAKER EVER BUILT!

THE QO FAMILY



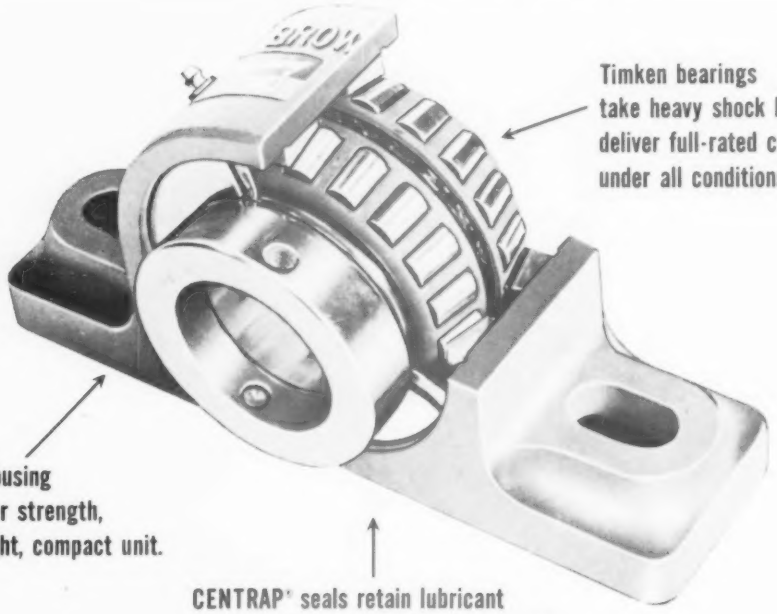
QO 1-POLE 15-50 Amp | QO 2-POLE 15-70 Amp | QO 3-POLE 15-50 Amp | QI 2-POLE 70-100 Amp | QI 3-POLE 70-100 Amp

SQUARE D COMPANY

wherever electricity is distributed and controlled

For more facts circle 383 on READER SERVICE CARD

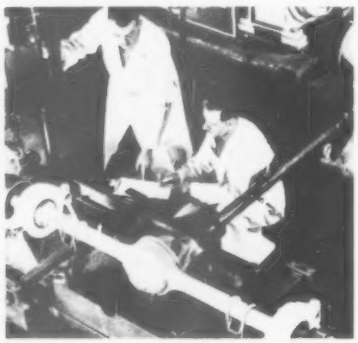
Browning malleable housings team up with Timken® bearings for greater capacity and strength



To be sure their PB900 pillow block has maximum ability to take heavy loads, Browning Manufacturing Company, Maysville, Kentucky, uses a malleable housing and Timken® tapered roller bearings. The malleable housing permits a stronger yet lighter, more compact unit. The Timken bearings provide higher load-carrying capacity and longer life in minimum space—more than any other type of bearing.

It's the tapered design of Timken bearings that enables them to take *both* radial and thrust loads. Full-line contact between rollers and races and precision manufacture give Timken bearings *extra* load-carrying capacity. And they're made from the finest bearing-quality alloy steel available to withstand shock.

OUR ON-THE-SPOT ENGINEERING SERVICE saves customers time and trouble. Our graduate engineer salesmen help you select the most economical bearing for your job.



TESTING FACILITIES in our modern laboratories help us solve customer bearing problems—develop new bearings just as we did for Browning Manufacturing Company.

Industry rolls on

TIMKEN®

tapered roller bearings

The Timken Roller Bearing Company, Canton 6, Ohio. Cable: "TIMROSCO". Makers of Tapered Roller Bearings, Fine Alloy Steel and Removable Rock Bits. Canadian Division: Canadian Timken, St. Thomas, Ontario.

For more facts circle 384 on READER SERVICE CARD